FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP

OCTOBER 1, 1956

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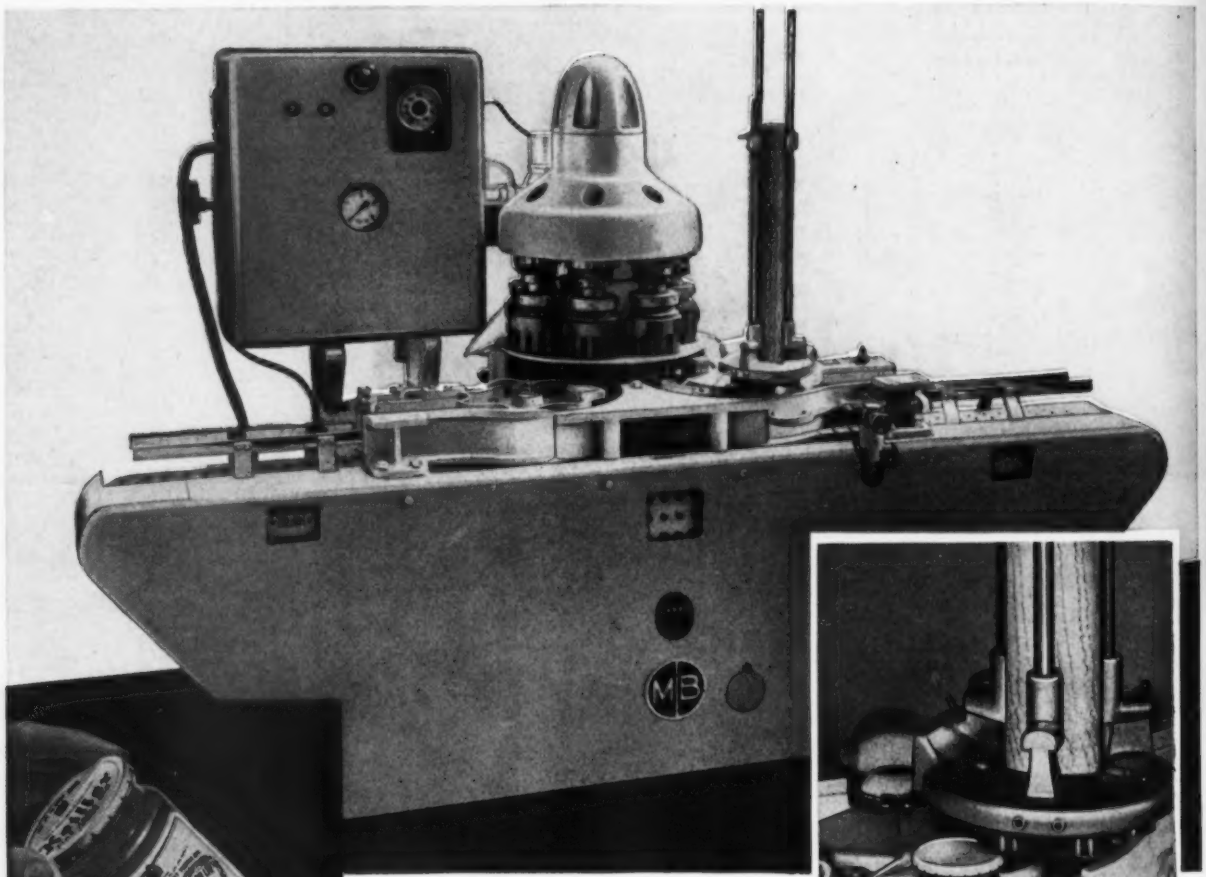

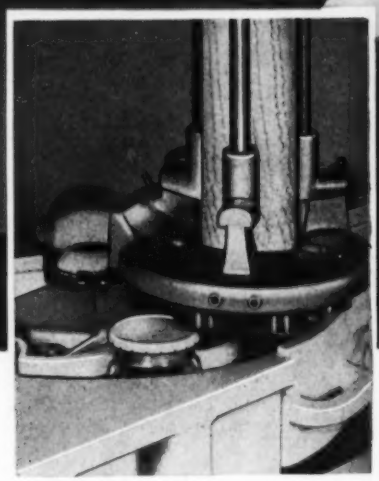

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HB 3734

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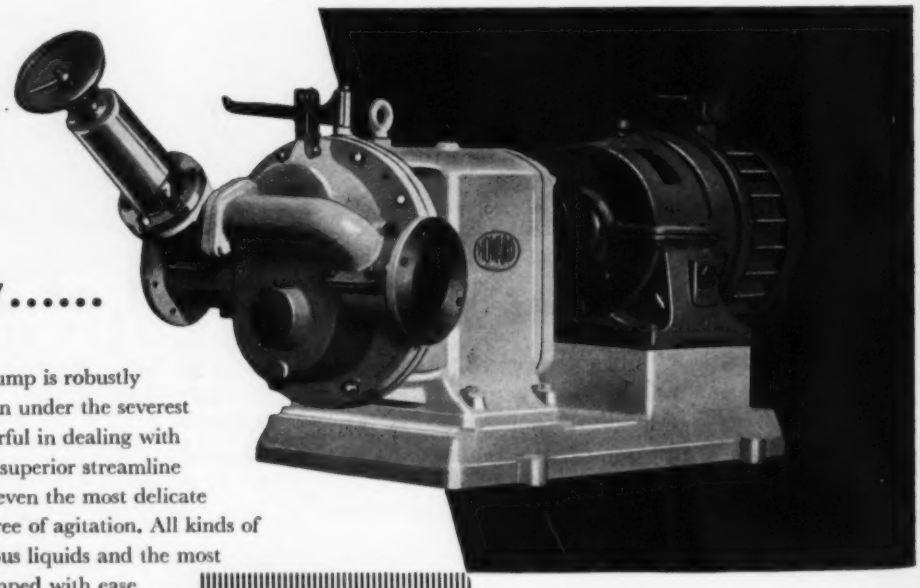

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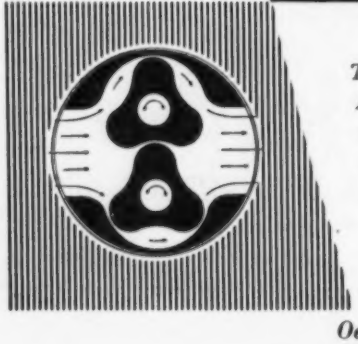

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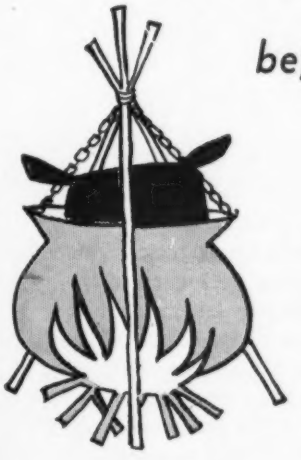


before bustling through the mixers

blblpping through the boilers

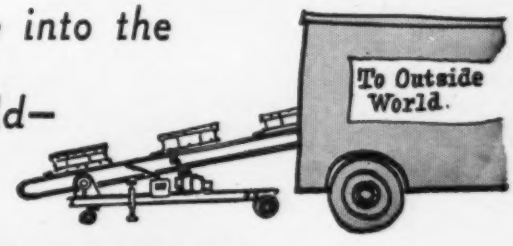
ambling through the cooling tunnel

waltzing around the filler

titivating in enrobers only to be

labelled and borne into the

melee of the outside world—



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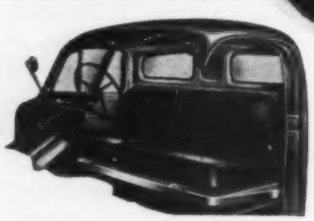
It will pay you to get to know more about the new Kew-Dodge before you decide on your next truck.



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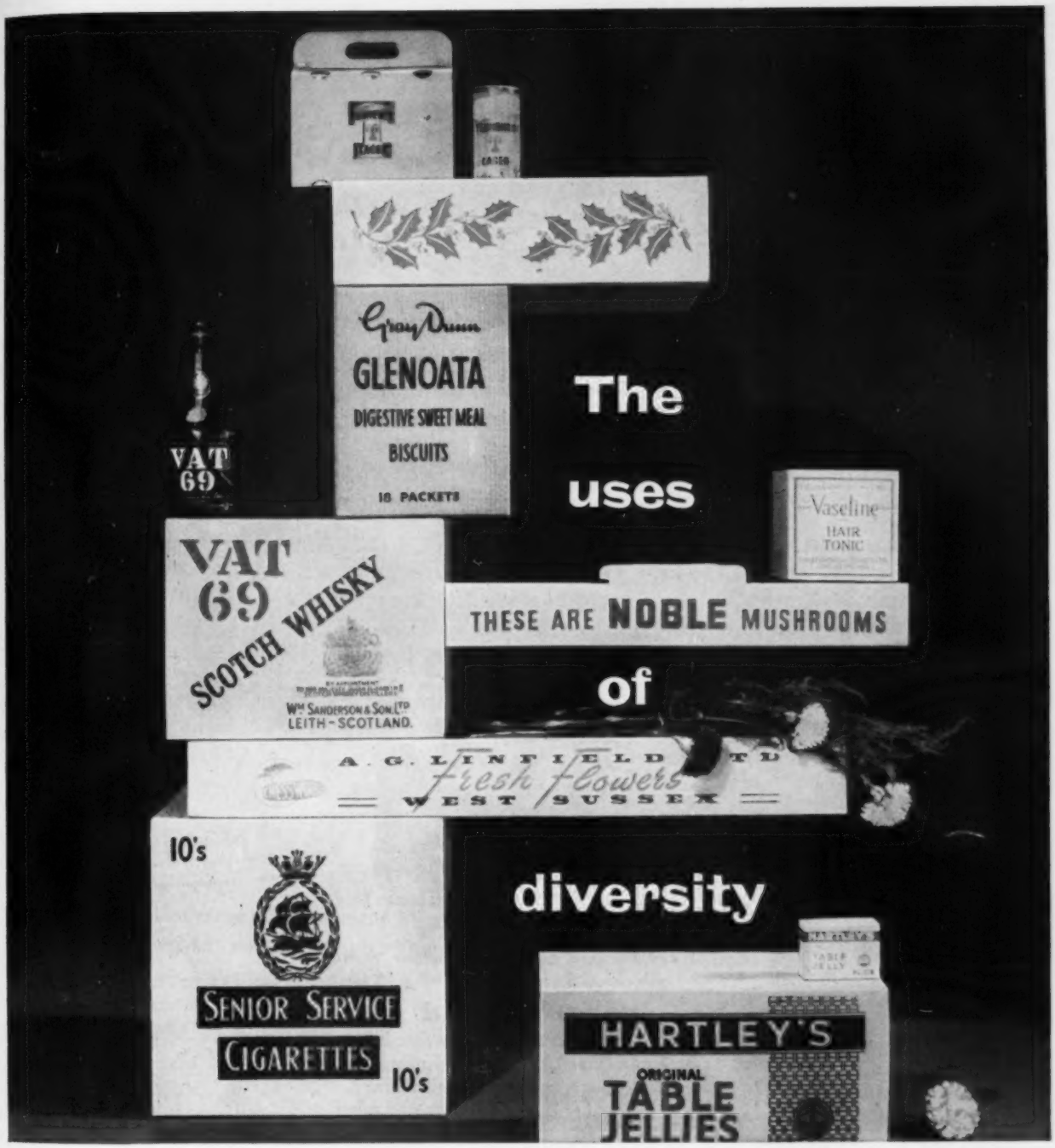

Sweet they may be, or bitter, for corrugated cases are equally adept at carrying jam or beer. They take one shape to supply sauce to the village store, another to deliver a cathode-ray tube safely to Hong Kong. Their diversity is part result, part inspiration of the great growth of demand by manufacturers. But corrugated cases do not rest on their laurels—the future holds greater diversity still. A further stimulus to diversity has been the merging of the corrugated case interests of Bowaters with the manifold packaging activities of the Eburite Group of Companies. Users of packaging can now take full advantage of the pooled experience and manufacturing and marketing resources of . . .

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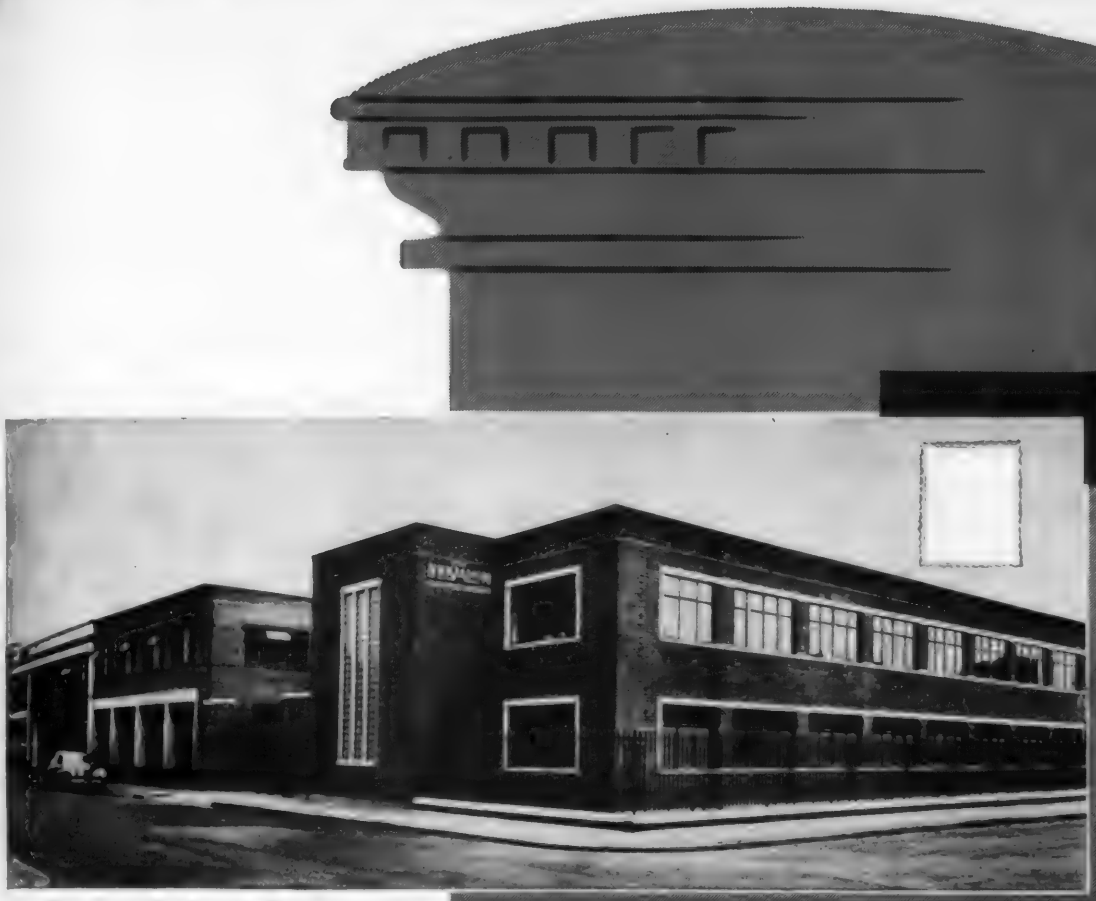

View of part of The Benjamin Works, Tottenham.

AN ILLUMINATING* ADDRESS

*Our vast range of tungsten and fluorescent fittings supplies a practical solution to most lighting problems.

And for matters that need talking over first, the Benjamin Illuminating Engineering Service — backed by years of valuable experience—provides top-flight advice and recommendations.

These are just two good reasons why you should bring your problems to Benjamin . . . the home of good lighting.

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Smee's 56

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A *NEW* MIKRO PULVERISER NOW AVAILABLE

No. 1SH Mikro-Pulveriser completely equipped, including motors, drives and switches, wired and mounted on stand legs; a complete self-contained grinding plant.

Dry or wet milling to 300 mesh B.S.S. Blending and Dispersion. Employing all the outstanding features of the smaller and larger MIKRO-PULVERISER range.

DESIGNED FOR HOURLY OUTPUT CAPACITIES 250/500-lbs. 5 h.p.

Built for precise particle control, the MIKRO-PULVERISER provides higher production at lower cost. New development has particular value in processing of heat-sensitive materials. In many cases it will effect a 25% reduction in temperature rise with a corresponding increase in production per horse-power hour. Its enhanced efficiency widens its field of application by making possible grinding of certain materials hitherto found baffling or impossible to handle.

Examples	*Hourly Outputs*					
FACE POWDER MIXTURE	350-lbs.	FIRST-CLASS BLEND				
SUGAR	350-lbs.	85-87%	THROUGH	300	MESH	B.S.S.
KAOLIN	450-lbs.	100%	,,	,,	,,	,,
GYPSUM, RAW	1,000-lbs.	88%	,,	100	,,	,,
CHROME, YELLOW	750-lbs.	99·9%	,,	200	,,	,,
ZINC OXIDE	350-lbs.	99·9%	,,	300	,,	,,
ICING SUGAR	350/600-lbs.	87 or 67%	,,	300	,,	,,

Please telephone or write for full specification and prices of all models to :—

Exclusive Manufacturing Licensees for PULVERISING DIVISION, METALS DISINTEGRATING COMPANY INC., SUMMIT, NEW JERSEY, U.S.A.

MIKRO-PULVERISER (FINE) -ATOMISER (ULTRA FINE) -FIL UNIT (100 PER CENT)

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Rota-Pro Continuous Processing operates through a closed, mechanically controlled system which brings a small volume of product into intimate contact with a large heat transferring surface.

Heat transfer is rapid and efficient, resulting in a uniformity of treated material and a greatly improved final product. Rota-Pro requires minimum operator attention, maintains the highest standards of hygiene and offers big economies in processing time and labour. Wide capacity range up to 8,000 lbs. per hour.

HOW ROTA-PRO WORKS

A clean heat transfer service is constantly exposed by revolving scraper blades. This together with the high ratio of heat transfer to volume of treated product, assures intimate contact and efficient mixing.

THE IDEAL SYSTEM FOR
heating · cooling · freezing
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PASTES · CREAMS · SYRUPS · FATS
LARD SHORTENING · FRUIT PURÉES
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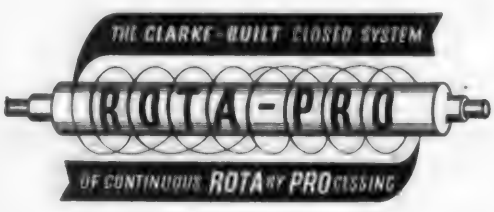
IF ROTA-PRO GIVES YOU IDEAS OF APPLICATION IN YOUR FIELD, OUR ENGINEERS WILL BE GLAD TO CO-OPERATE



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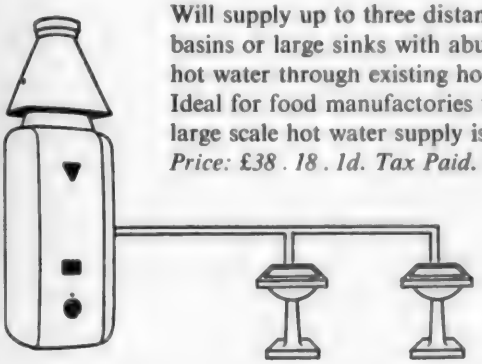
THE LAW SPECIFIES 'HOT WATER'

Here's why you should specify Ascot!

The Ascot hot water system makes it easy and economical for everyone in the food and catering trades to comply completely with the new, stringent Food Hygiene Regulations specifying a controlled hot water supply. An Ascot gas water heater gives you an instant, endless flow of really hot water at low cost—hot water that's on tap from the moment you open your premises right up to when you shut up shop. Ascots are easily and cheaply installed, and the wide range available includes models to meet every need of every food trader.

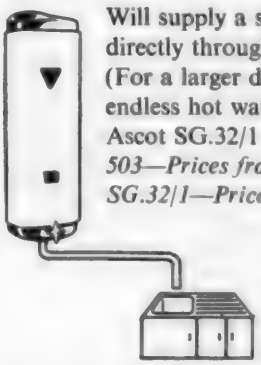
Whatever your hot water problem under the new legislation, Ascot can solve it. Full information from any gas showroom or from Ascot's own Advisory Service.

ASCOT 709 LARGE MULTIPOINT



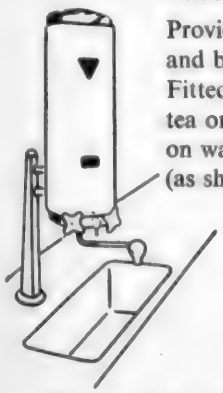
Will supply up to three distant handbasins or large sinks with abundant hot water through existing hot taps. Ideal for food manufactories where a large scale hot water supply is essential.
Price: £38 . 18 . 1d. Tax Paid.

ASCOT 503 SINK WATER HEATER



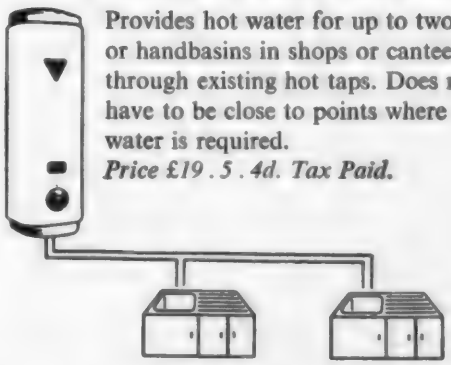
Will supply a sink or handbasin directly through a swivel spout. (For a larger direct supply of instant endless hot water to a big sink, the Ascot SG.32/1 is ideal.)
503—Prices from £14 . 17 . 3d. Tax Paid.
SG.32/1—Price: £33 . 15 . 4d. Tax Paid.

ASCOT 509 BOILING WATER HEATER



Provides warm or hot water instantly and boiling water in less than a minute. Fitted with 3-heat control. Ideal for tea or coffee making. Can be installed on walls, or on shop or bar counters (as shown) on an Ascot pillar support.
Price: £25 . 6 . 6d. Tax Paid.

ASCOT 503/4 SMALL MULTIPOINT



Provides hot water for up to two sinks or handbasins in shops or canteens through existing hot taps. Does not have to be close to points where water is required.
Price £19 . 5 . 4d. Tax Paid.

Where hot water is essential... Ascot service is providential!

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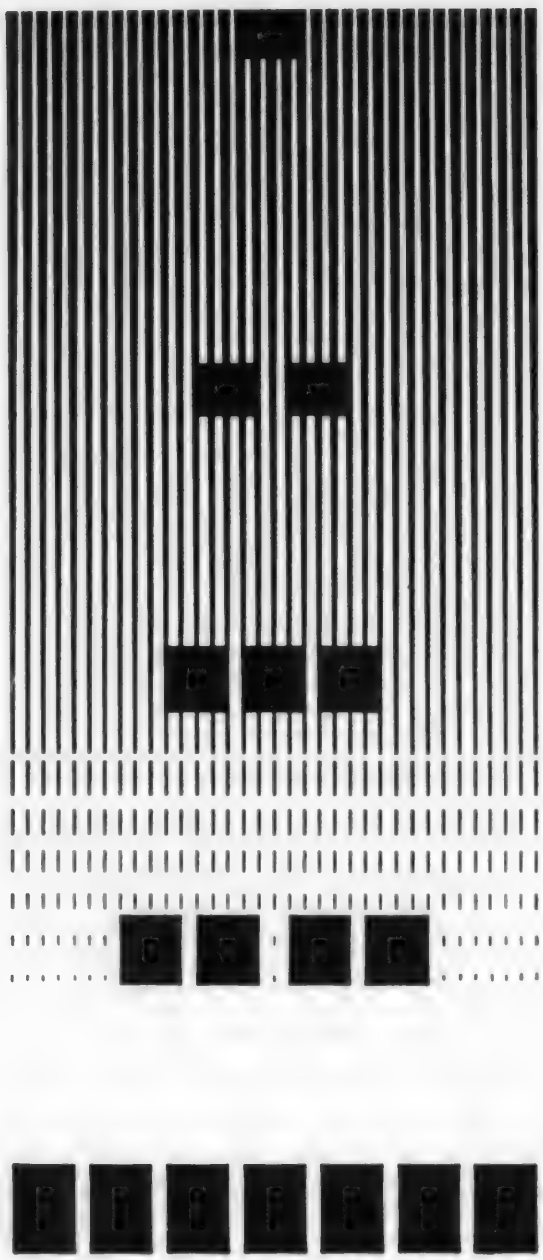

Production grows with good lighting

IN THE MAJORITY of works today the lighting is inadequate or unsuitable, or both. Production is slower than it could be, mistakes are made, health and tempers suffer.

Money spent on a planned lighting system is the best of investments. The foreman can see how things are going; the craftsman at his machine can work more accurately and easily because he can see what he's doing.

Good lighting is only one of the ways in which electricity is playing a vital part in the drive for higher productivity.

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We specialise in the manufacture of plant that will speed the flow of your materials and increase output. Our equipment for more efficient handling includes food processing plant, can-handling plant, friction and bar elevators and cable conveyors.

Consult us on your particular requirements.

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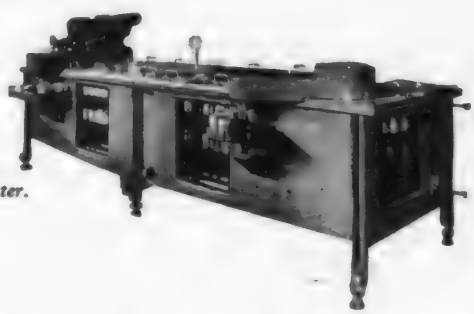

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—the *one* name for

New Zealand Honey

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'know-how'
at work for you

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Metal Box designers have hundreds of case histories to call on when planning your container.

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To advise on the installation and maintenance of high-speed filling and closing machinery at the end of your production lines.

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The largest laboratories in the country devoted entirely to research into packaging problems.

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A world-wide service that studies marketing trends and can supply up-to-the-minute information in any consumer field.

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MEGATOR

SOME MEGATOR FACTS

***High suction lift** permits installation in convenient positions.*

***Self-priming** inherent without any added device.*

*"**Snoring**" ability sucks out the last drop.*

***Constant capacity** at varying pressures.*

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***Simple.** Designed for easy maintenance.*

***Capacities** from 4 to 250 galls. per minute.*

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Wide range of colours available.

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Continuous work-top surface all round laboratory if required.

Smooth-running drawers and silent-closing doors.

Low cost—IMMEDIATE DELIVERY.

★ ***See page 74 of "Laboratory Practice" Feb. 1956.***

These furnishings include:

Floor Cabinets with work-top surface and generous drawer and cupboard storage space.

Tall Floor Cabinets with shelves for storage.

Sink Units with single or double sinks and drainers in stainless steel or vitreous enamel, with large storage cupboards below.

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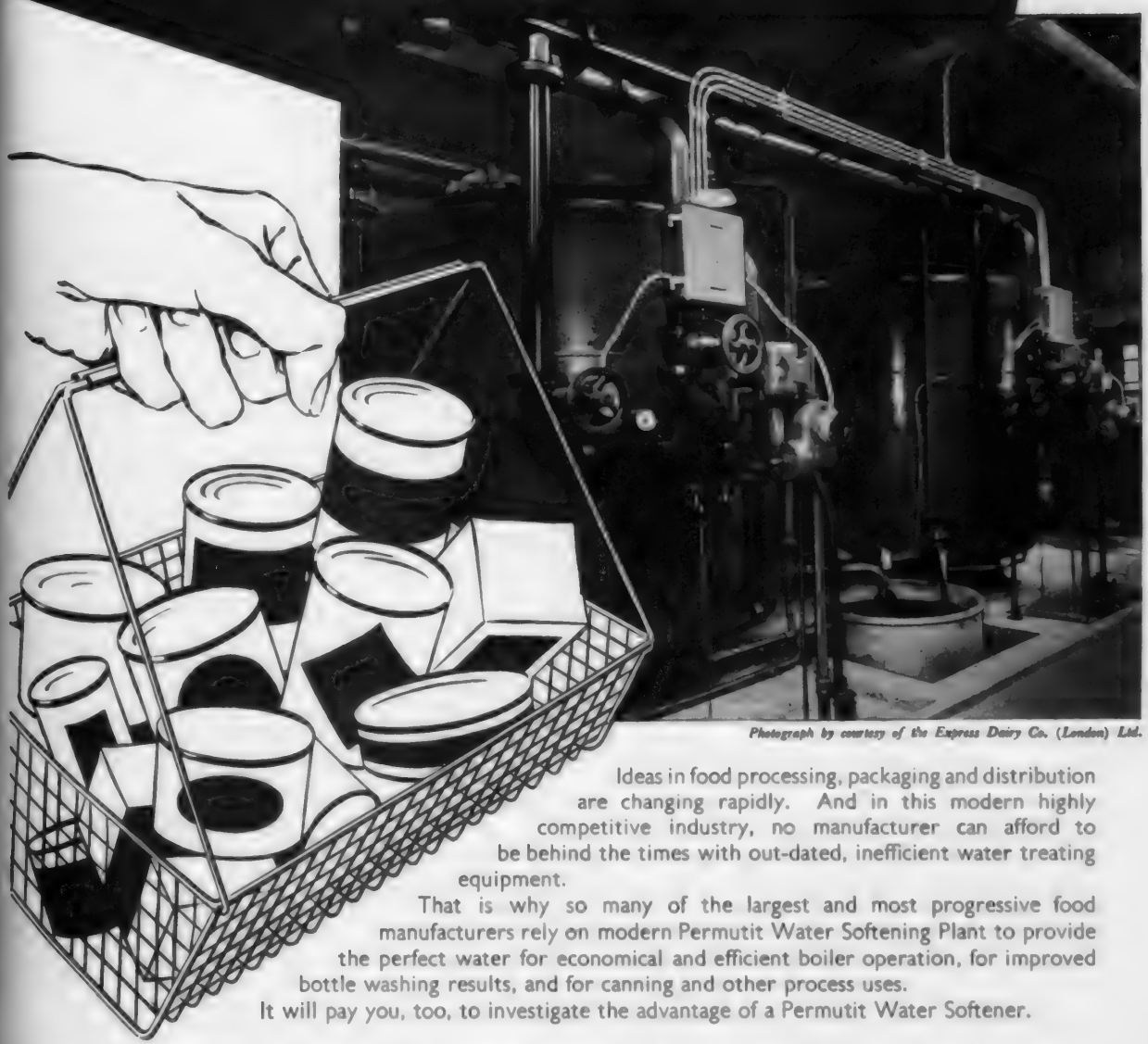
WATER TREATING PLANT SERVES THE MODERN FOOD INDUSTRY



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Ideas in food processing, packaging and distribution are changing rapidly. And in this modern highly competitive industry, no manufacturer can afford to be behind the times with out-dated, inefficient water treating equipment.

That is why so many of the largest and most progressive food manufacturers rely on modern Permutit Water Softening Plant to provide the perfect water for economical and efficient boiler operation, for improved bottle washing results, and for canning and other process uses.

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Designed to promote sales
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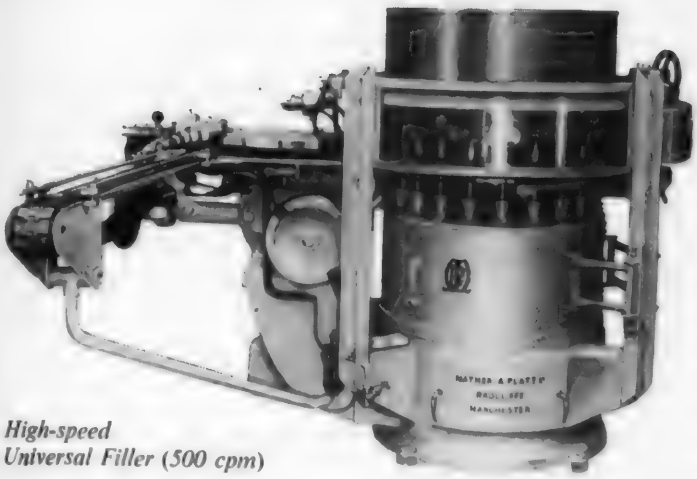
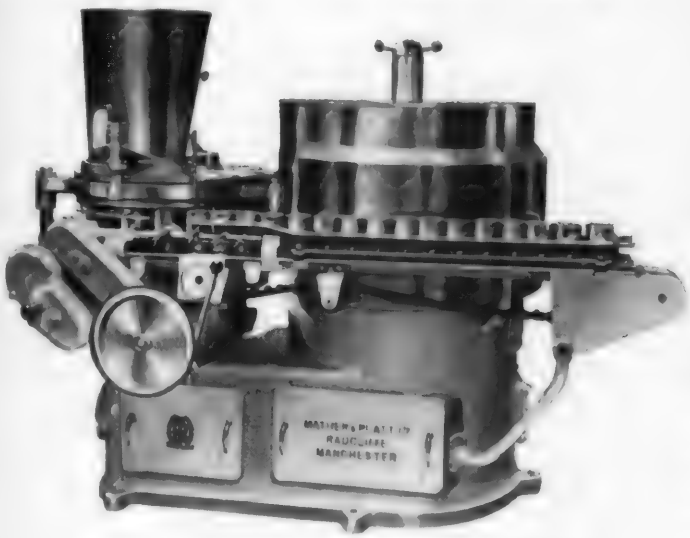


High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)

A10 Can Filler (30 cpm)

MODERN FILLING MACHINERY

These modern machines are part of a new and complete range of designs by Mather & Platt Ltd for the canning industry. They combine a high degree of accuracy with high speed and simple and economical maintenance.

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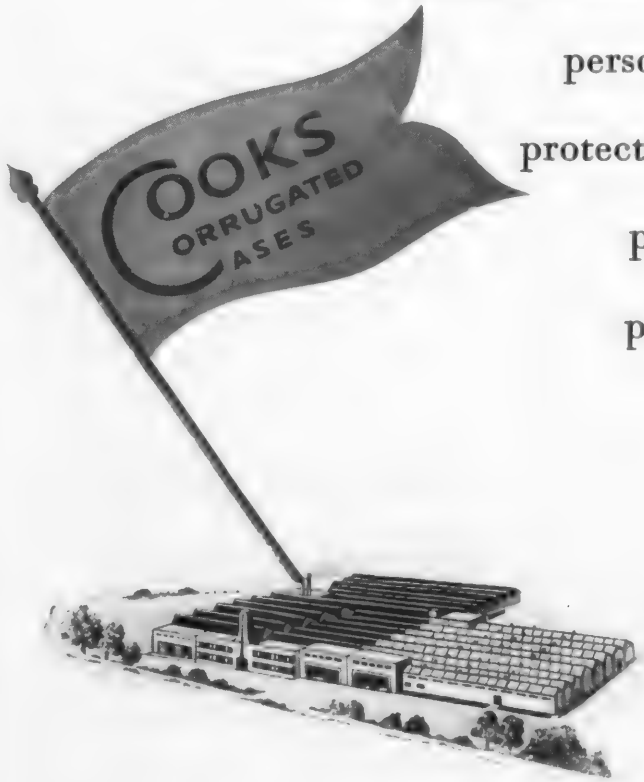

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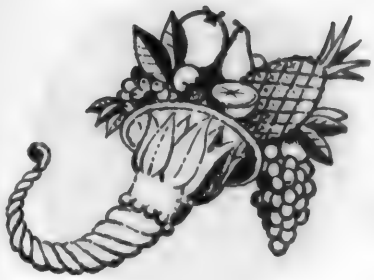

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A reliable steriliser

Vantoc AL is of interest to all manufacturers of soft drinks. It is a surface-active quaternary ammonium bactericide. It penetrates and destroys infection in mixing pans, syrupers, pipe lines, fillers and bottle stoppers. Its solutions, which may be applied hot or cold, are odourless, non-corrosive, non-toxic and safe to handle. Vantoc AL is highly effective against yeasts and a wide range of bacteria at the concentrations recommended.

Write for 'Surface Active Agents Leaflets' No. 6 and No. 22.

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1½" S 7. stainless steel meter with screw on flanges and 12" vertical index.

When you require to measure bulk or batch quantities of edible liquids, oils, spirits and solvents, hot or cold water, we can supply meters with summating, resettable, electrical presettable, direct reading or pointer type index attachments (as illustrated) and control equipment.

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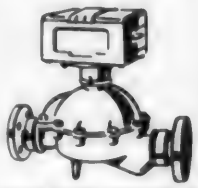

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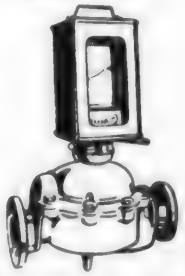
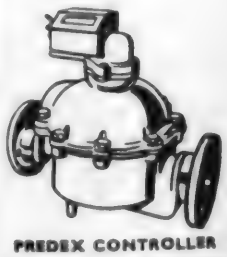
Re-settable batch-dispensing counter with 7-digit cumulative total register.

6" VERTICAL RE-SETTING INDEX
Can also be used to pre-set a determined quantity, with electric trip to operate solenoids, pumps, warnings, etc.

ZEROSET INDEX
Simple turning motion re-sets indicator to zero.



MECHANICAL RECORDER
Gives a graphic record on 5" x 12" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods.



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Automatic means for continuous dispensing of fixed quantities of liquids.

boosts your output of scroll cut strip

The larger, wider bed of this shear takes the bigger 36″ × 36″ sheets (allows more strips per sheet). What's more, its higher speed lets you feed more sheets; helps you to step up production, step down costs. And its rugged design gives you precise, high-speed blanking year after year.

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Identified as No. 1100, this new shear is *one more example* of what you can expect from Bliss' new can machinery programme. It's *one more reason* to keep your eyes on Bliss can machinery.

WHY YOU GET LONG SERVICE LIFE . . .

- slitter shafts mounted in anti-friction bearings
- air friction brake and clutch for fast engagement, quick release
- automatic lubrication and underslung drive—no oil-spoiled sheets

AND EASY OPERATION TOO!

- electric pushbuttons for safe, quick control
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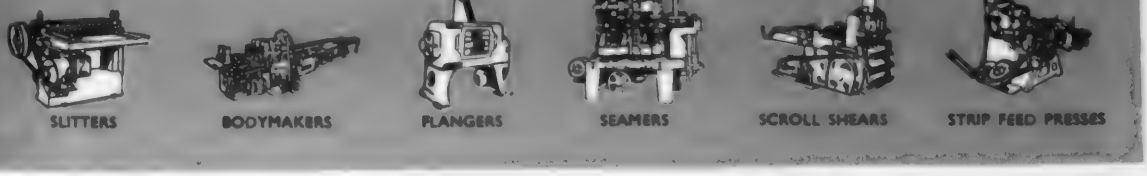
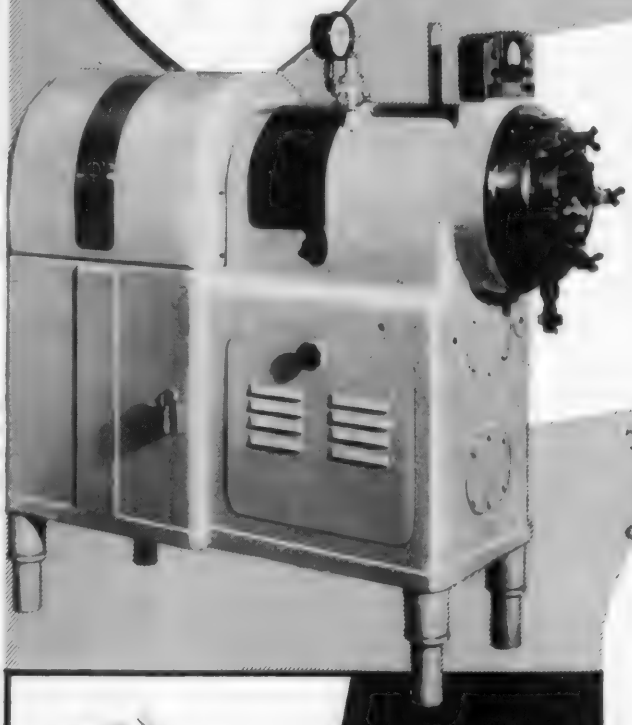
BLISS *is more than a name . . . it's a guarantee*

BLISS CAN AND CONTAINER MAKING MACHINERY



The C·P FAT CHILLER & PLASTICISER

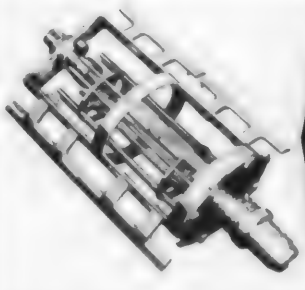
FOR CONTINUOUS PROCESSING



CONTROLLED PROCESSING
QUALITY IMPROVEMENT
PERFECT TEXTURE
FLEXIBLE OPERATION

The C.P. Plasticiser is specialist designed and precision built for the production of chilled and texturated fats on a continuous basis. It is particularly suited to the manufacture of biscuit fats, margarine, cooking fat, lard and allied products. Simplicity and flexibility in operation are special features. Where required an aeration unit and pump can be incorporated.

This machine is adaptable to many other trades and industries—and is available in three capacities.



The exclusive C·P DASHER AND RE-ACTION BEATER

is a vital component, providing intensive agitation during chilling, thereby controlling crystallisation and structures.

ALREADY SAVING COSTS IN MANY WELL-KNOWN CONCERNS

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(Formerly The Creamery Package Mfg. Co. Ltd.)

MILL GREEN ROAD · MITCHAM · SURREY

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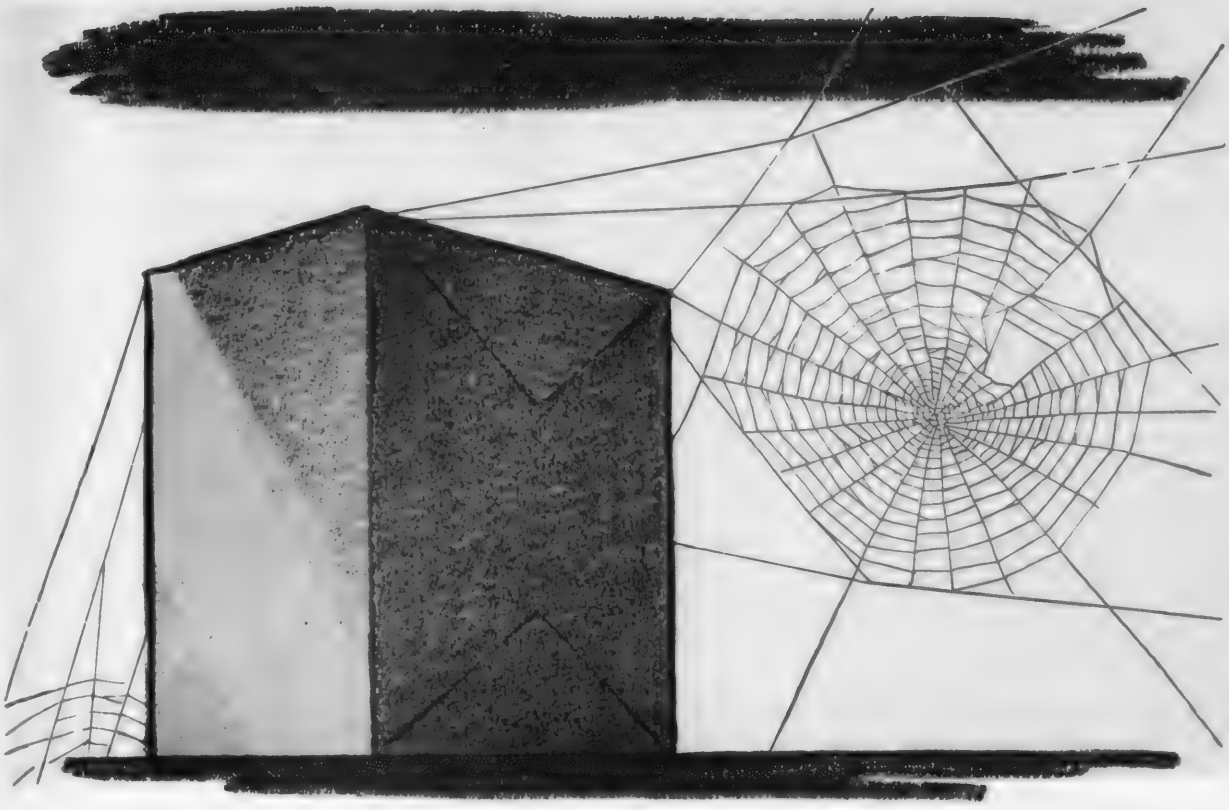

Yet it's factory fresh the day that it's opened!

Put your product in a Telcothene package—and it's safe from bad storage. Safe from dirt and damp. Safe from chemical contamination. And safe for a long long time.

Telcothene coated papers make perfect hermetically sealed inner wrappings for foodstuffs and perishable goods. In addition their toughness makes them very suitable for use in the manufacture of moisture proof outers, as instanced by multiwall paper sacks, fibre board drums, cartons and similar containers. The cost is not high; the results in terms of prestige and customer goodwill are rewarding indeed.

Look into this Telcothene business—your converter will be able to prescribe its place in your packaging department; or write direct to us, our technical department is at your service.

..it's Telcothene packed!

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For liquids, semi-liquid and viscous products, including jams, jellies, marmalades, soups, lemon curd, creams etc. Filling rates up to 240 1 lb. containers per minute. Smooth, accurate non-spill filling, micro-regulated.

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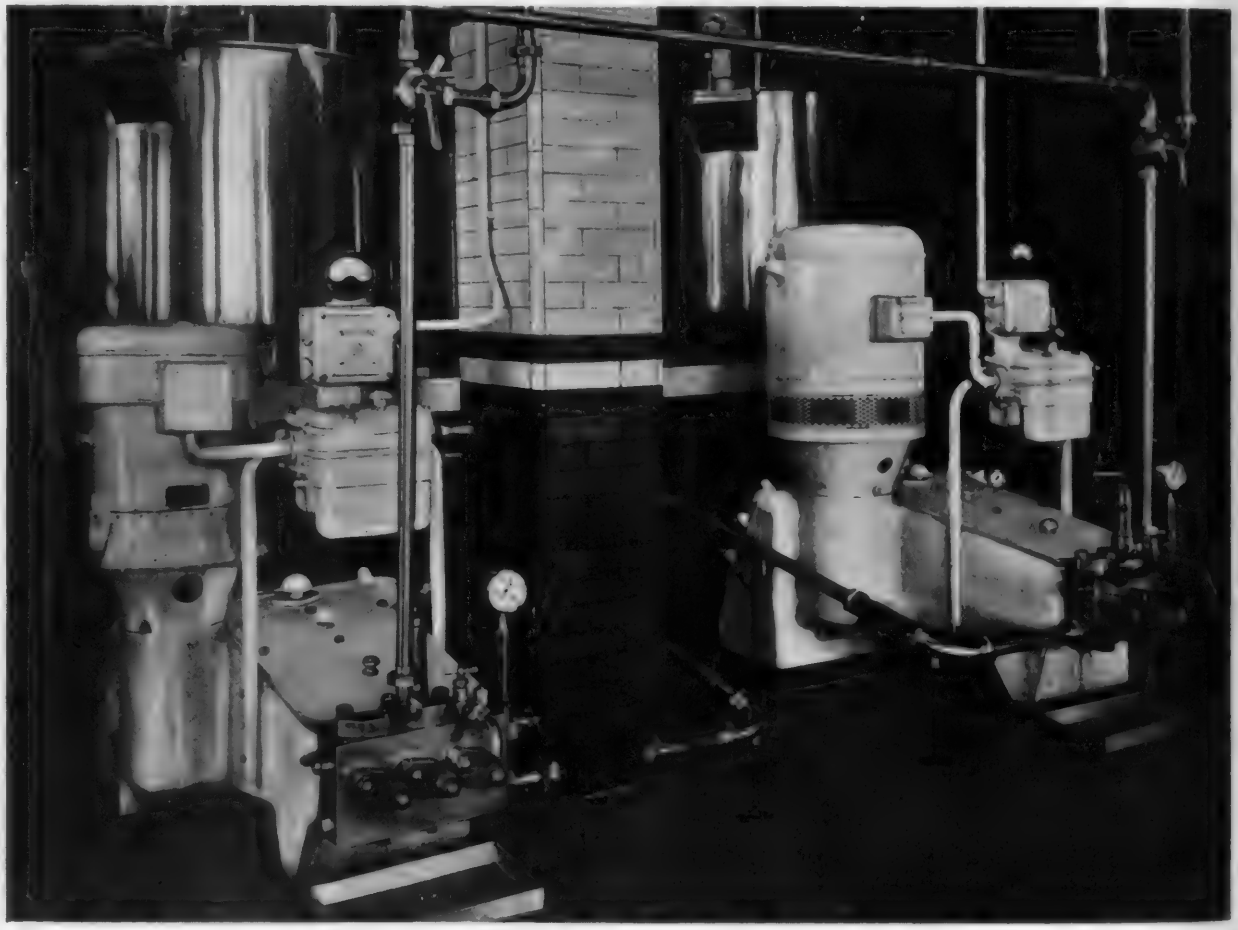

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- ★ **ALL PURPOSE HEAVY & LIGHT DUTY** Each belt can be made endless and supplied in any number of plies and widths.

As used in the following Industries :

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FOOD BELTING

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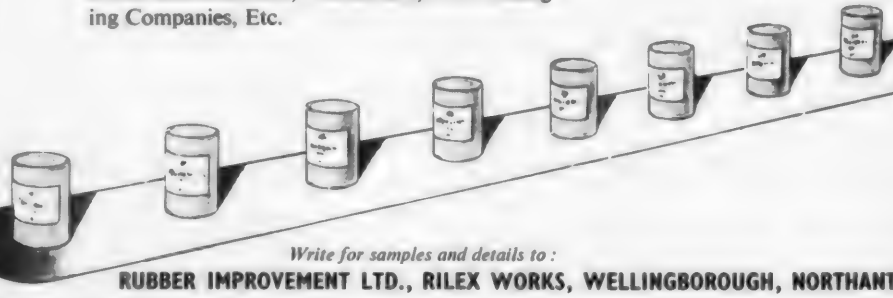

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Send for free Brochure "New Defences Against Corrosive Attack"

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The hygienic wrapping which protects food products and adds to their sales appeal. It is the logical choice for most products sold in self-service shops.

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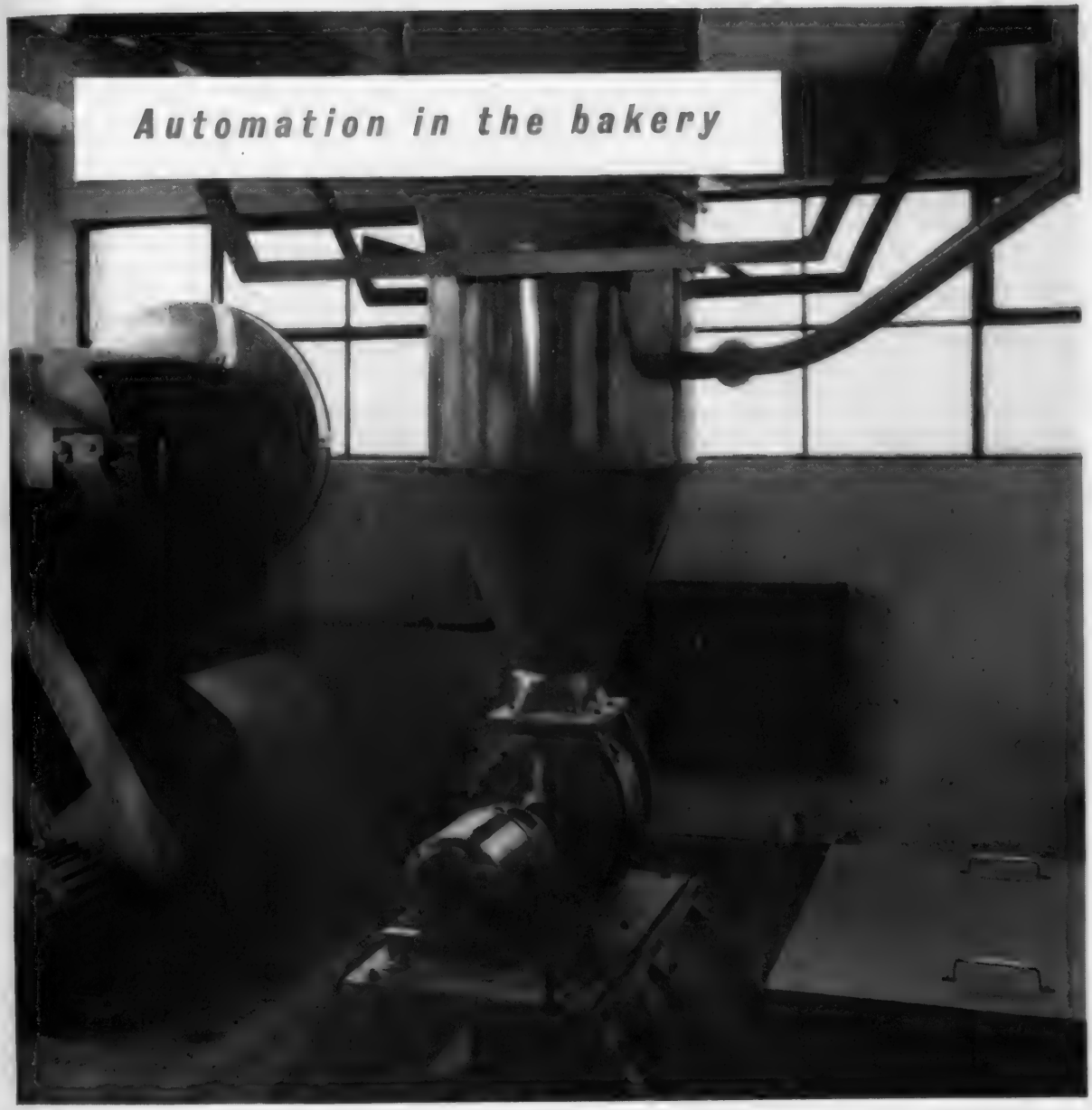

An industrial duster

The air which conveys flour through pipes in Simon Bulk Flour Handling and Storage schemes must be perfectly clean and free of particles of flour when it is released to the atmosphere.

Bakeries equipped with the Simon system create no dust nuisance. The Simon Aeroflow Transit Separator filters the conveying air so that no flour at all is withdrawn from the system.

This device is also one of the links in Bulk Flour Handling and Storage which eliminates flour wastage and saves bakers thousands of pounds every year. You, too, can save money with the new method. Why not find out more about it—now?

SIMON

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HS 232/PS

VISQUEEN–lined bags

keep their contents in perfect condition

WHY are these patented 'Alkaflex' bags, made by E. S. & A. Robinson Limited, Bristol, lined with 'Visqueen' polythene film?

Because ... 'Visqueen' keeps moisture in and unwanted moisture out.

Because ... Simple closure by heat sealing gives the product lasting protection ensuring factory-freshness upon opening.

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'Visqueen' converters are leaders in the design and production of flexible packages. A converter of 'Visqueen' film will provide you with the exact package to suit YOUR requirements. Post this coupon to the address below for full details.

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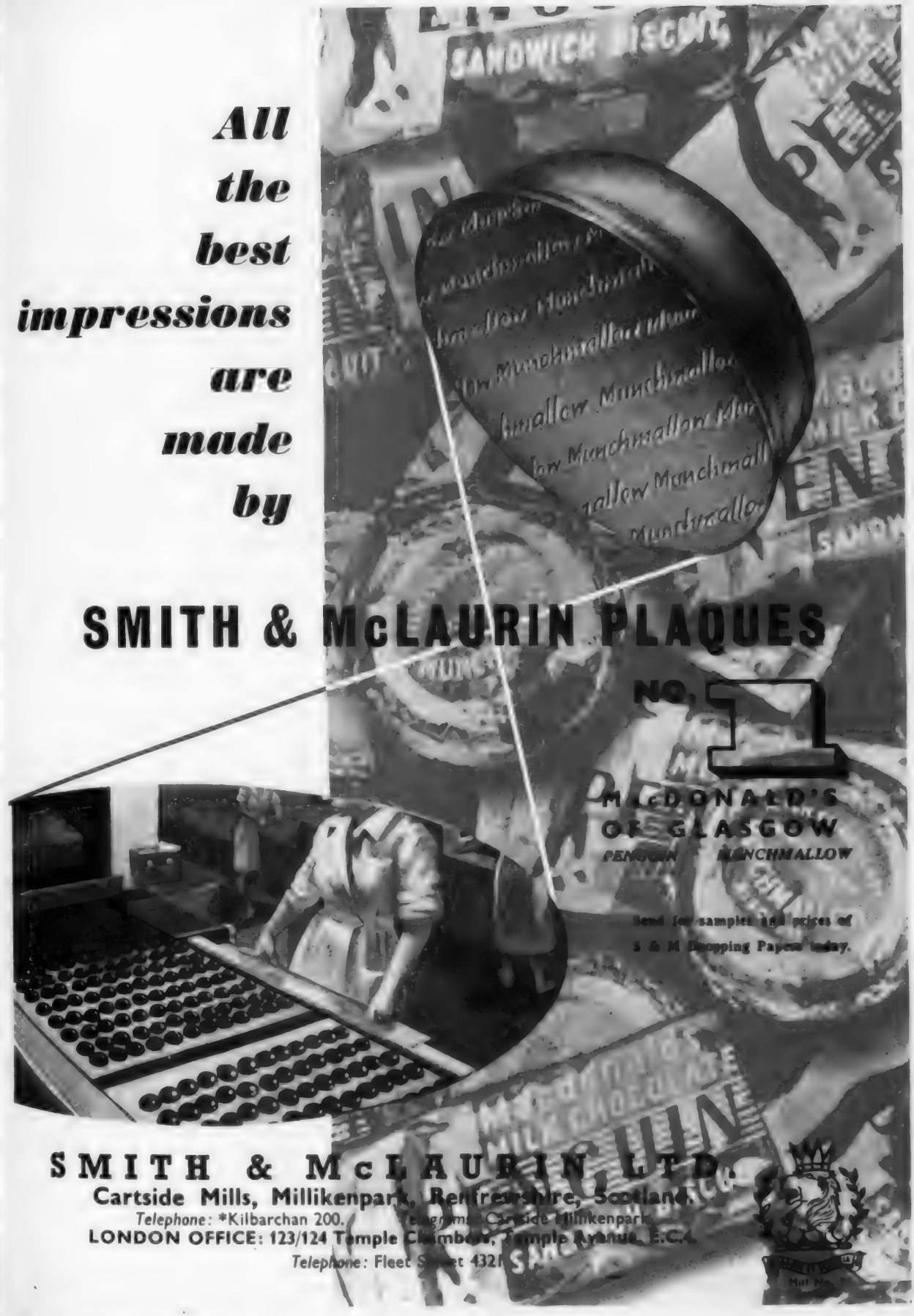

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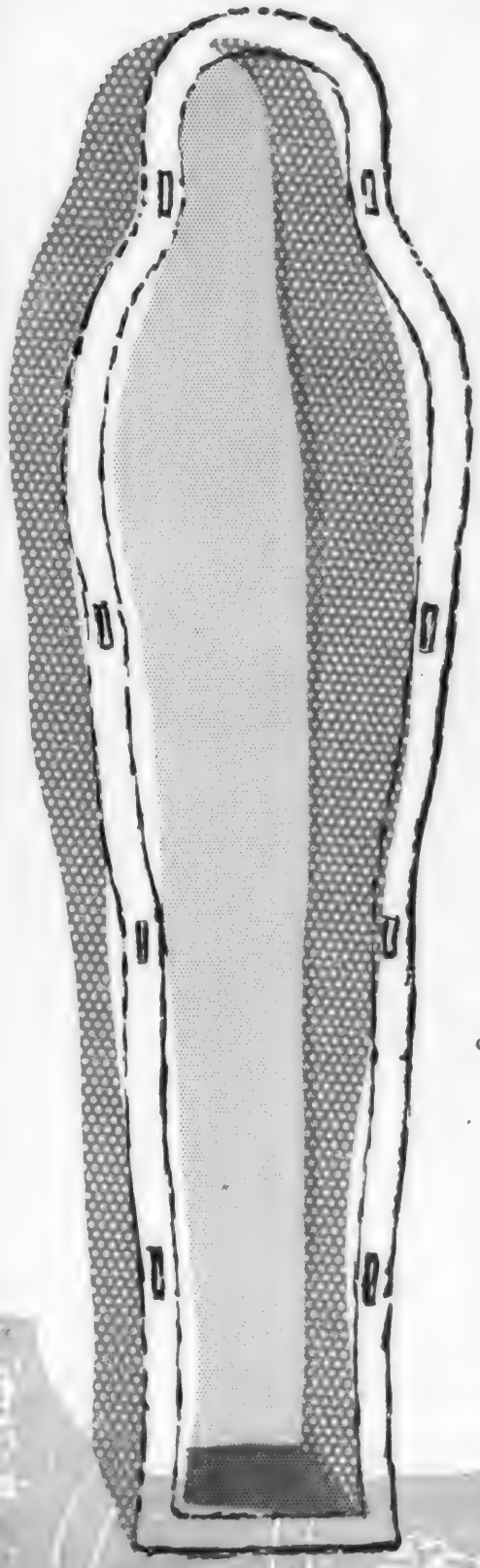
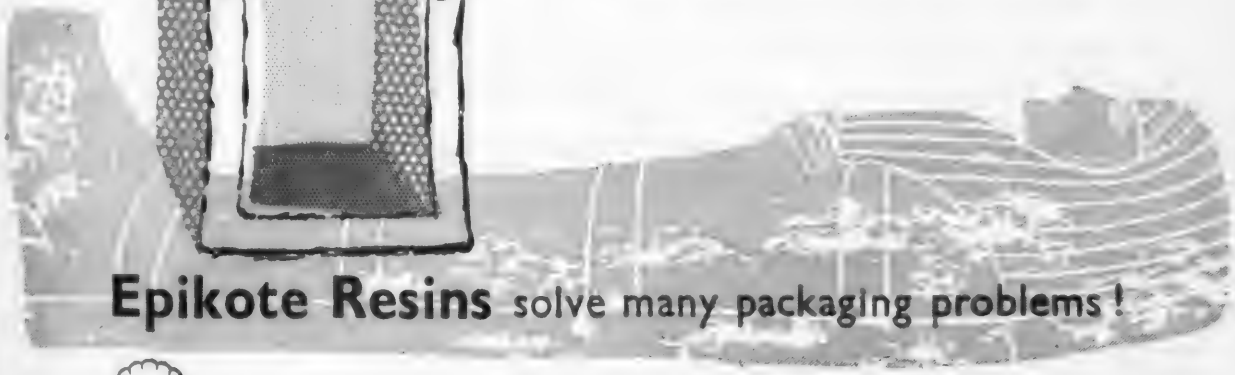


Still wrapped up in the past?

Or discovering packaging improvements with ***Epikote Resins?***

Many ancient problems of the packaging industry have now been solved by Shell's development of Epikote Resins. Decorative and protective coatings based on these new resins are unaffected by the contents of the pack and have outstanding abrasion resistance — so enhancing their shelf life and customer appeal.

Ask your packaging supplier to put you really up-to-date about Epikote Resin based coatings.



Epikote Resins solve many packaging problems!

SHELL

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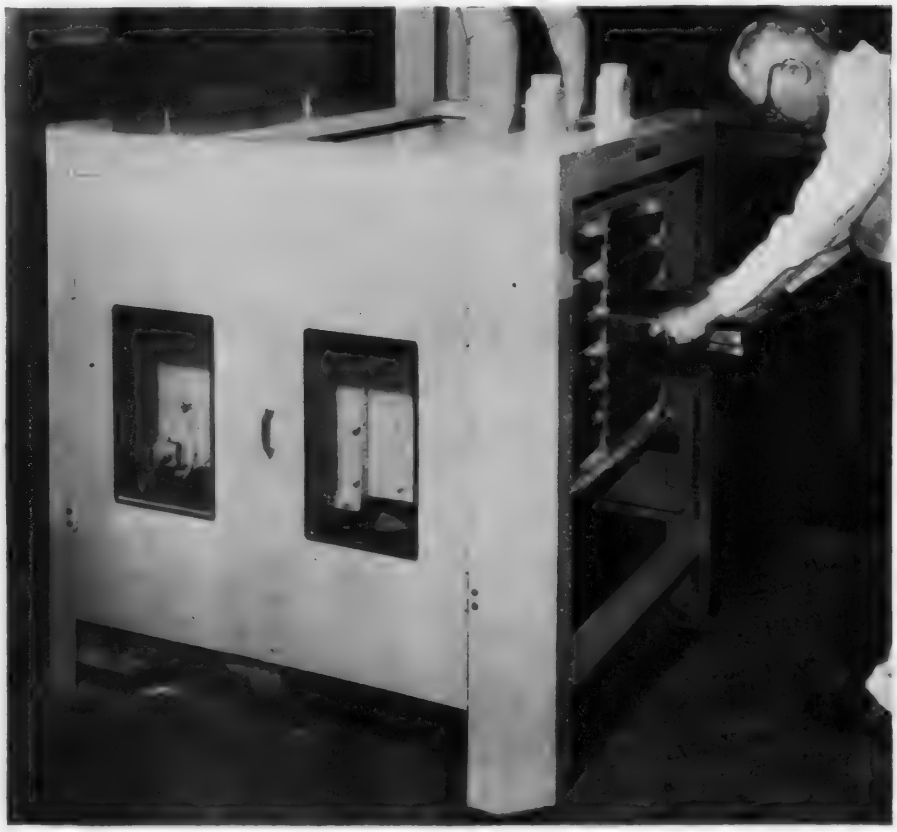
"EPIKOTE" *is a Registered Trade Mark*

JUNIOR'S A big BOY NOW!



The Simon Junior Sifter has grown to be a big name in the food and confectionery world. This less-than-four-feet-square machine is now screening, grading and sifting flour, cocoa, starch, icing sugar, etc., in plants all over the country. The persuasive rotary motion of the horizontal sieves gives a gentle but positive separation of powders and granular materials, with throughputs up to three tons per hour. Its totally enclosed metal body means absolutely dust-free operation. Interchangeable aluminium trays and easily removed "drawer-type" sieves add to Junior's efficiency and simplicity.

- Low power consumption—a ½ h.p. motor is usually sufficient.
- Takes up little floor space.
- Easily changed internal flow for different separations.
- Simple to install and maintain.
- Tough, durable Rotatubes replace textile sleeves—make perfect, dust-tight outlets.

Products handled include:

- **Synthetic Vitamins**
- **Custard Powder**
- **Moulding Starch**
- **Starch & Dextrines**
- **Cocoa**
- **Flour**
- **Sugar**

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Stainless Steel Jacketed Agitated Reaction Vessel

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the secret of Fine Puff Pastry

THE CHOICE OF FAT

HIGH-QUALITY puff pastry should have even layer formation, together with good volume and a regular shape. The choice of fat for puff pastry is of great importance. A suitable fat must have these qualities:

1. It must stand up to production techniques.
2. Have good plasticity at normal working temperature and not penetrate the dough layers.
3. Maintain unbroken layer formation throughout operations.
4. Confer 'built-in' qualities, such as richness and a good flavour background. To produce crisp, dry-eating pastry with a bright, appetising appearance.

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CBC's quality margarines, such as Dolphin, because of their consistency and plasticity, stand up to the widest range of production techniques—including fully automatic machine production. There is no breaking down. The dough layers separate effectively to produce many hundreds of even and regular laminated structures, so ensuring good volume and light flaky pastry with a richer flake and a better 'bloom'.

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But Dolphin and the other CBC margarines are just one section of the wide CBC range. As long-established specialists, CBC are well versed in all aspects of baking. This wide experience of fats is at your disposal. The Sales Director will be happy to hear from you at any time. Just 'phone CITy 6783 or write him at the address below.

Whatever you produce,
a CBC quality fat exists to meet your need.

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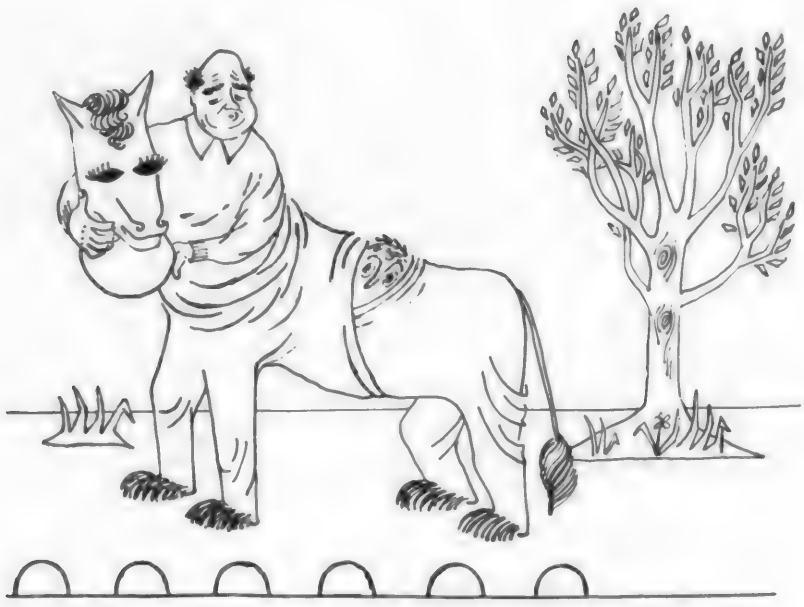
CCT 56-5-120

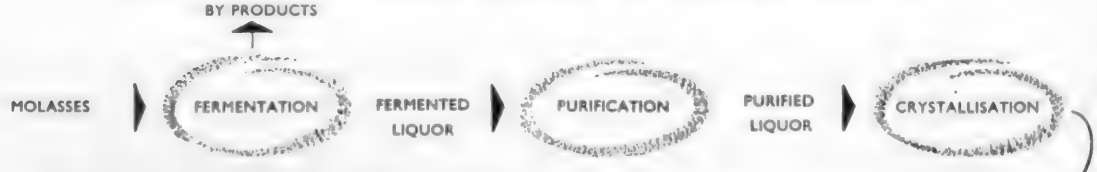
FINE CITRIC ACID IN THE MAKING



Off with its head

Revolt lurks perpetually in our new artist's breast. His desire for innovation shows itself in eccentricity of dress, habits and outlook on industry. Admittedly he never yet had a picture hung upside-down — he generally manages to turn his subjects inside-out. Show this latest effort of his to a psychiatrist, mention artistic licence and horse mania in passing, and the psychiatrist would see at once that the drawing clearly represents a stage in producing Sturge citric acid.

As molasses is converted into acid-containing liquor by fermentation a felt of mould is also formed and when the optimum amount of citric acid has been produced this 'head' is removed. The felt contains an important Sturge by-product, ergosterol, the starting material for the synthesis of Vitamin D_2.



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IS ALWAYS IN DEMAND

Collapsible metal tubes combine eye-appeal . . . utility . . . and novelty. They offer a tremendous sales impetus to whatever food product is first in its field with this new idea in food packaging. *That product could be yours.* Why not talk to H. G. Sanders about it?

Tubes for food packaging offer a variety of advantages—to the housewife and to you. They are handy and economical, providing an applicator as well as a pack. Contents last indefinitely, protected against drying out and contamination. Tubes are light yet strong, giving maximum contents for minimum bulk. Their initial cost, including cap, liner and printed-on label, is moderate; and quick automatic filling and closing, and reduced breakages and freightage charges all help keep down production costs.

Above all, TUBES SELL MORE.

SATURN

SANDERS

FOOD PACKAGING IN TUBES

Technical advice and co-operation on any tube-packaging project freely available. Please write or telephone:

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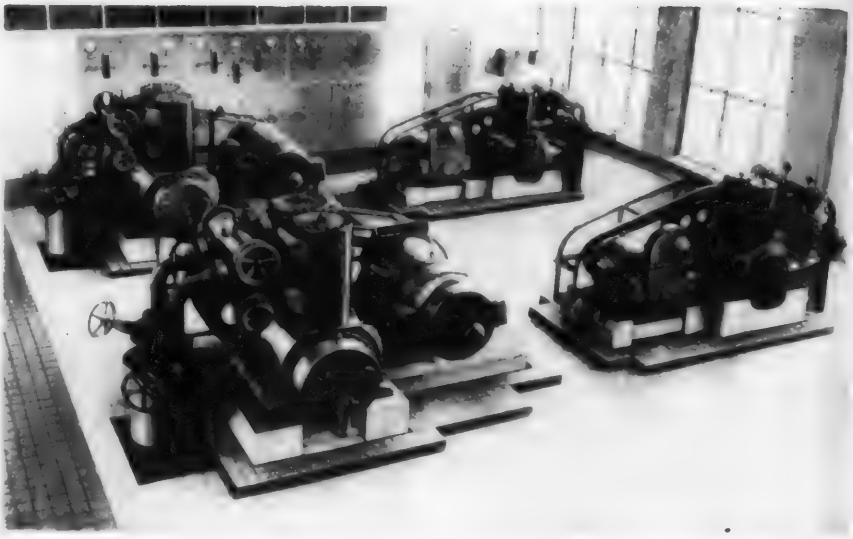

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- slaughter houses
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We shall work out the project and quotation to comply with your technical requirements.

We have long years of experience in the installation of such equipment in different climatic conditions.

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Seal your pack with " Viskrings " and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with " Viskrings ". There is a " Viskring " to fit every bottle neck, available in a wide range of colours. " Viskrings " can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

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- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

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never fails . . .

keeps food fresh . . .

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M-W.93

'Bring down costs of production' *says Minister*

"At present we need more beef; and more mutton if costs can be brought down. At least as many pigs we have provided that

Here is your way

Strömmen

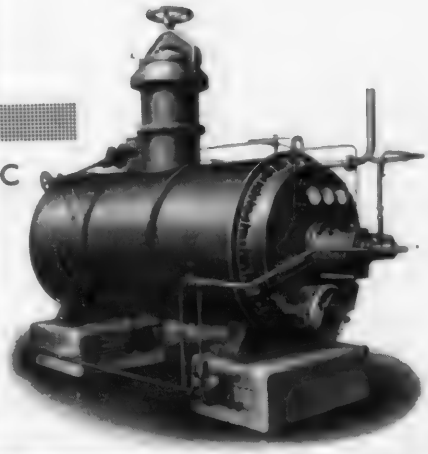
A

A.—Auto Fat Melting Plant for production of edible fat from fresh bones.

B.—De-Hairing machine for scalded pigs. A solid, robust construction with single drum.

C.—Strömmen SUPER Dry Melter. Exceptionally speedy process. Steam heated agitator and shaft. Large filling hopper. Eliminates bone crusher. Minimises cutting work. A first-class product.

C



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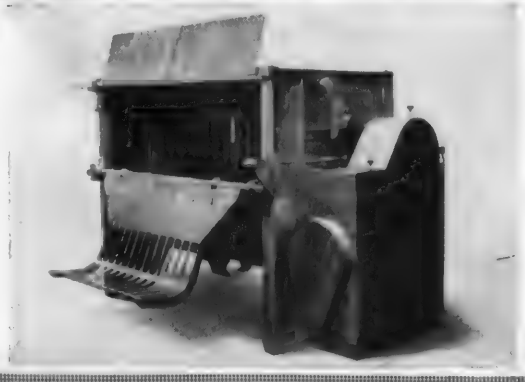

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CLEAN FOOD

AND THE FOOD HYGIENE REGULATIONS

Concerning A Feature in "About the Home" Programme B.B.C. Television.

IMPORTANT new requirements in the interests of food hygiene became law on July 1st. The protection and preparation of all meats receives special attention. Recently, during a clean food demonstration on B.B.C. Television, 'Visking' casings were used to illustrate the most satisfactory way to protect a variety of meat products. 'Visking' casings ensure not only hygienic presentation of prepared meats, but give them the enhanced appearance possible only when crystal clear 'Visking' material is embellished with the brilliant printing which only Viskase can produce. 'Visking' also make Nojax casings for the popular SKINLESS SAUSAGES

VISKASE

VISKING

CASINGS

"Visking" is the registered trade mark of the Visking Corporation.

VISKASE LTD., 40 CHANCERY LANE, LONDON, W.C.2 · Telephone: Chancery 8111

Every objection you ever raised against installing a conveyor has been answered by

Rapistan

FLEXIBLE UNIT "PACKAGED" CONVEYOR SYSTEMS

Forget, forever, the expensive old-style conveyor engineered for a particular job, and around which (except at further vast expense) all subsequent production plans must be centred.

Here's a unit conveyor system which can be added to, replanned or rebuilt at short notice, and can be adapted either to full-scale Flow system or small, portable or permanent, individual units.

Lower Installation Cost . . . Standardisation of components and units so reduces costs that "Rapistan" is invariably the most economical conveyor system to install. Additionally, you need plan only for NOW with "Rapistan". Future production developments can be considered later and implemented with the minimum expenditure.

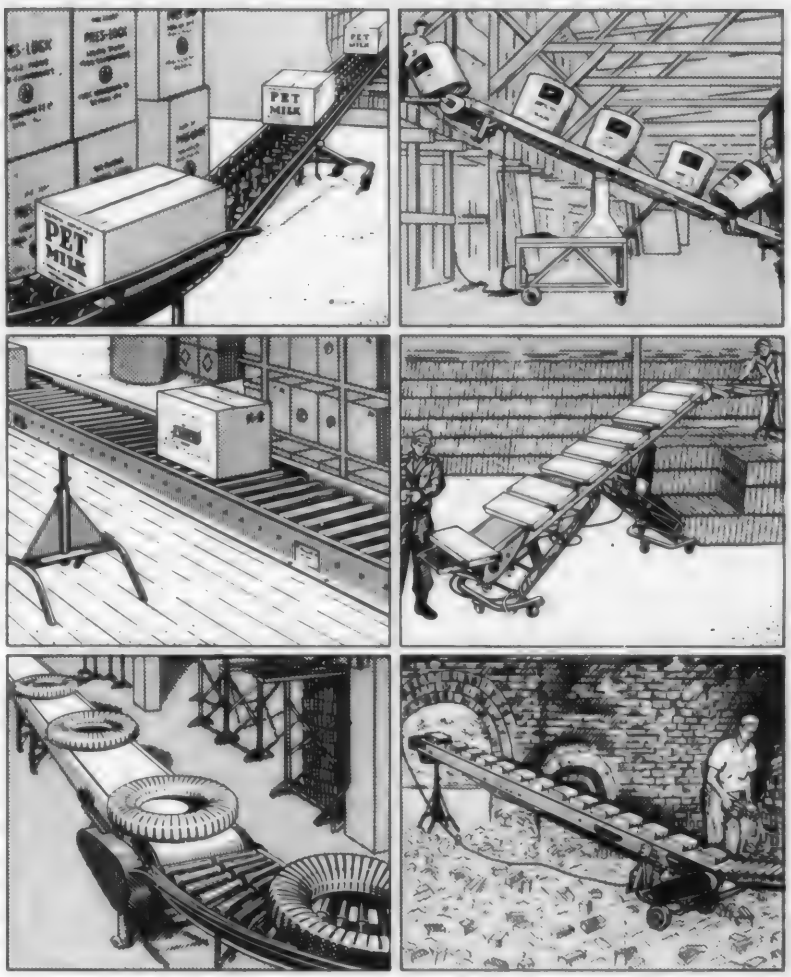
Lower Depreciation . . . Because any "Rapistan" installation may be so easily adapted to other uses, re-sale value is high.

Easier, Cheaper Servicing . . . Separable units are obviously easier to service; and as every "Rapistan" part can be replaced from stock and fitted by your own staff, maintenance costs are low.

Versatility . . . Standardised-length "Rapistan" units (both Power and Gravity) may be built up into a complete multi-floor system; or supplied as single units—either permanent or portable.

Individual units of a complete Flow system are so easy to separate that they will readily do double duty . . . a portable-type "booster" unit may be taken from a Flow system momentarily out of operation, and used for loading and unloading.

Efficiency . . . "Rapistan" conveyors have been proved over many years in many of America's largest concerns and go from strength to strength in the face of a highly competitive market. All the engineering skill and know-how which have made "Rapistan" a household name in the United States have now been made available in the U.K. . . . "Rapistan" products, now manufactured in Hull to traditional British Standards, can be depended upon for a lifetime of service.



CAN YOU AFFORD NOT TO INSTALL A "RAPISTAN" CONVEYOR?

Every reason you ever had for not installing a conveyor is a good reason why you should investigate

Rapistan

BETTER CONVEYING EQUIPMENT

Illustrated Catalogue showing how "Rapistan" Conveyor Systems could help in your Factory or Warehouse, gladly sent on request.

—NOW MADE IN ENGLAND BY:

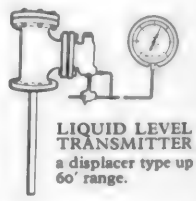
MANUFACTURERS EQUIPMENT CO., LTD., SUTTON ROAD, HULL

Telephone: 13996 (3 lines)
Telegrams: "RAPISTAN, HULL"

What's wrong with this picture?

At a glance, nothing. But who would judge industrial efficiency at a glance? *You* wouldn't; you'd want to take a good look inside—at the control methods among other things. You'd want to know whether they were fully automatic at every suitable point. And you'd be right; for nowadays the really efficient plant uses automatic controls to save manpower and increase efficiency. And that means Sunvic. Sunvic make control and measurement equipment for almost every purpose in many major branches of industry. Sunvic controllers, relays, transmitters and thermometers are labour-saving, efficient and completely dependable. We shall be glad to offer expert advice on your control and measurement problems.

CONTROLLER
operating on the pneumatic force-balance principle.



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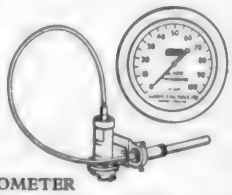
a displacer type up to 60' range.

PRESSURE TRANSMITTER
for measuring a wide range of process pressures up to 10,000 p.s.i.



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gas filled thermal system, force-balance operated.

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TEMPLEFIELDS, HARLOW, ESSEX Telephone: Harlow 24231 *Member of the A.E.I. Group of Companies*
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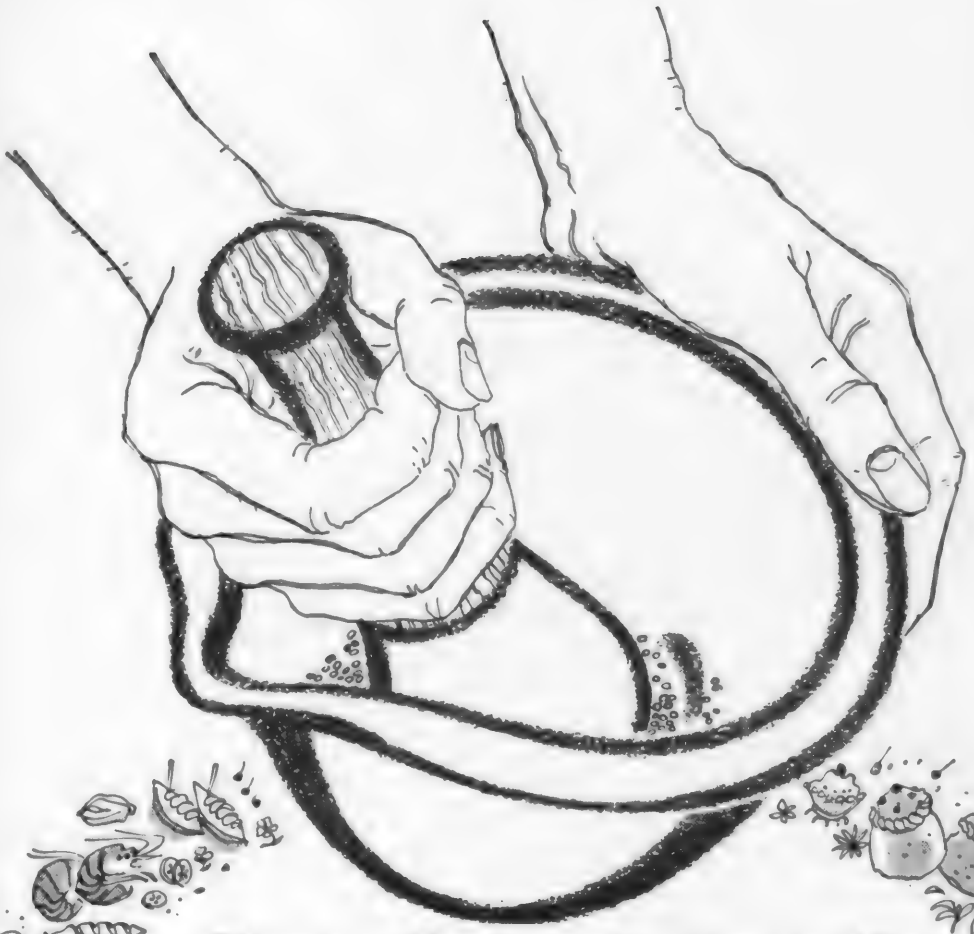

Stirring the imagination in the

BOEHM EXPERIMENTAL KITCHEN

In the Boehm Experimental Kitchen problems of food flavouring are tackled by experts. It is possible that they have tackled and mastered the kind of flavouring problem now causing *you* concern. So it might save you time and money to get in touch with Fredk. Boehm Ltd. immediately. Certain flavours in certain world-famous products owe their popularity to this organisation. The same skilled assistance is at your service, too, and it's free.

Fredk. Boehm Ltd., continues to produce and distribute:

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YEATEX Autolysed yeast extract
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THE STEEL COMPANY OF WALES LEADS BRITAIN'S GROWING STEEL PRODUCTION

Velindre Works is now operating

The new works at Velindre, near Swansea, is built on a site of 48 acres. It began operating on July 10th and will eventually double the Company's production of cold-reduced tinplate.

Velindre is similar to the tinplate works at Trostre, which was completed in 1951. Trostre is already producing at a rate of more than 400,000 tons per annum. The equipment at Velindre will be of 95% British manufacture and will include electrolytic tinning lines capable of producing all weights up to 1 lb. and differential coatings. The combined resources of the Company's new plants will include five electrolytic tinning lines, 16 hot-dipped tinning pots, with automatic inspection and stacking and the widest range of size, substance and temper.

One of the new developments in steel technology planned for Velindre will be a continuous annealing plant. The first of its kind in Europe, it will speed production while maintaining traditional high standards of quality.

As the production of this plant increases, the necessity for further tinplate imports—which in 1955 totalled 80,000 tons—will disappear.

This latest addition to the plants operated by The Steel Company of Wales not only expands production but also increases the range of specifications available.

The Steel Company of Wales Ltd

Tinplate enquiries should be addressed to
The Tinplate Sales Manager, The Steel Company of Wales Limited, Carmarthen Road, Swansea, Glamorgan

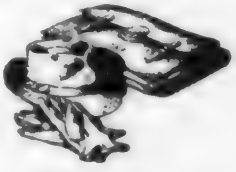
CLEAN and STERILISE

the B.H.C. way!

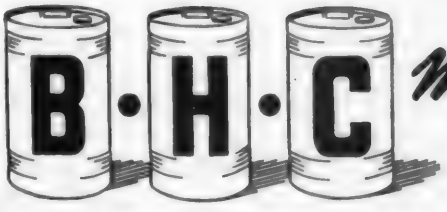
PLANT
EQUIPMENT
WALLS
FLOORS

Every cleaning problem in the food factory presents some different factor. Ideally one cleanser for every job would simplify matters, but this might not be a practical proposition nor economical. B.H.C. have many years experience in making the detergent fit the job. We have Analytical, Technical and Bacteriological Laboratories dealing exclusively with food trade problems.

Let us advise you — you only have to ring or drop a postcard for our Technical Representative to call.



SAVES TIME LABOUR AND MONEY



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For hygienic food processing use fittings made from

'DARVIC'

'Darvic' is the registered trade mark for the rigid p.v.c. sheet made only by I.C.I.

'Darvic' p.v.c. food conveyor buckets manufactured by Orbex Ltd., Manchester, for Mather & Platt Ltd., Radcliffe and installed in the works of Joseph Farrow & Co. Ltd., Peterborough.

'Darvic' P.V.C. sheet manufactured by I.C.I. is an ideal material for fittings and containers used in food processing plant. 'Darvic' is extremely tough and long-lasting, and rigid even in very thin sheets. It has high chemical resistance, is completely odourless and does not taint food or drink. This makes it very suitable for elevator buckets used in canneries. The shaping of 'Darvic' P.V.C. does not present any difficulties.

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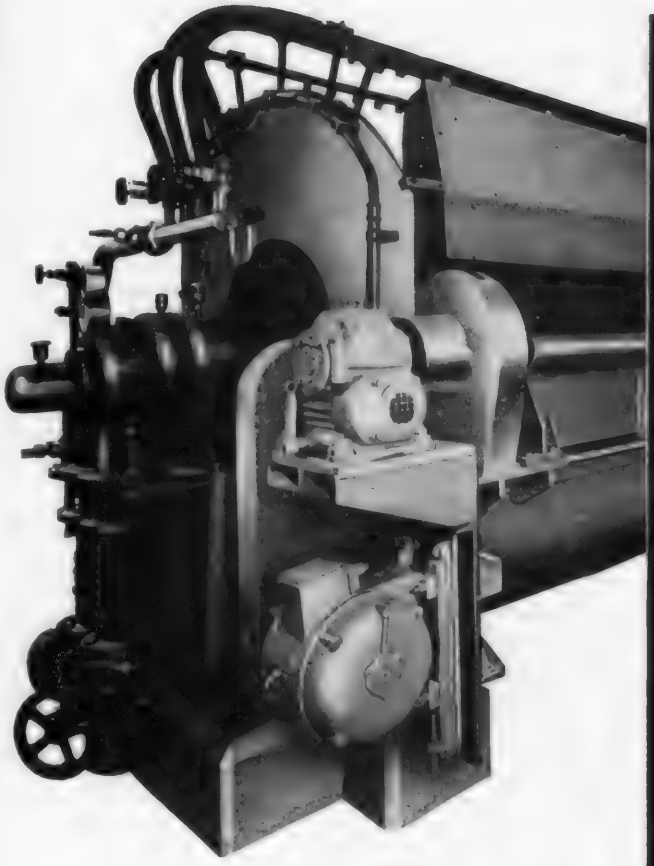
FILTERS



One of a pair of 75 sq. ft. Paxman Filters which are installed at the Corn Products Co. Ltd., Trafford Park, Manchester. (Industrial Division of Brown & Polson Ltd.)

FOR THE FOOD INDUSTRY

Many processes in the food industry involve continuous de-watering operations — in addition to which a high degree of purity must be maintained throughout. These requirements are fully complied with by Paxman Rotary Vacuum Filters, fitted with black or white rubber coverings and constructed in stainless steel, aluminium or other suitable alloy metals.

You will certainly be interested in our Publication No. 1436, a fully illustrated booklet showing some of the many applications of Paxman Rotary Vacuum Filters to modern industry. May we send you a copy?

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- *Available from stock*
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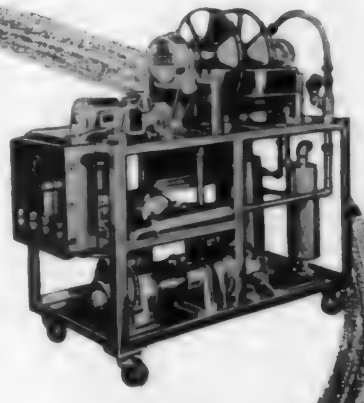
EIMCO

PORTABLE PILOT FILTER PLANTS

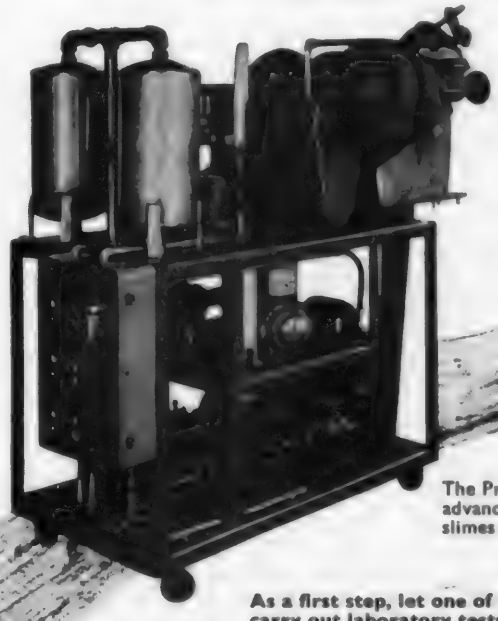
for "on the spot tests"

Eimco pilot plant filters, complete with all ancillaries, make it possible to take the plant to the sample, avoiding the possibility of change in the sample during transit, allowing extensive large-scale tests and giving accurate data to establish the optimum plant size and operating conditions.

The Rotary Vacuum Drum Filter can be arranged for either single or double solution operation, top or bottom feed, and scraper, string, roller or snap-blow discharge.



The Disc Filter, affording greater filter area per square foot of floor space, is particularly useful where no cake washing is required.



The Precoat Drum Filter is arranged with an automatic knife advance mechanism for shaving the precoat, thus removing slimes as they are deposited and allowing free filtration.

As a first step, let one of our engineers visit you and carry out laboratory tests with portable equipment.

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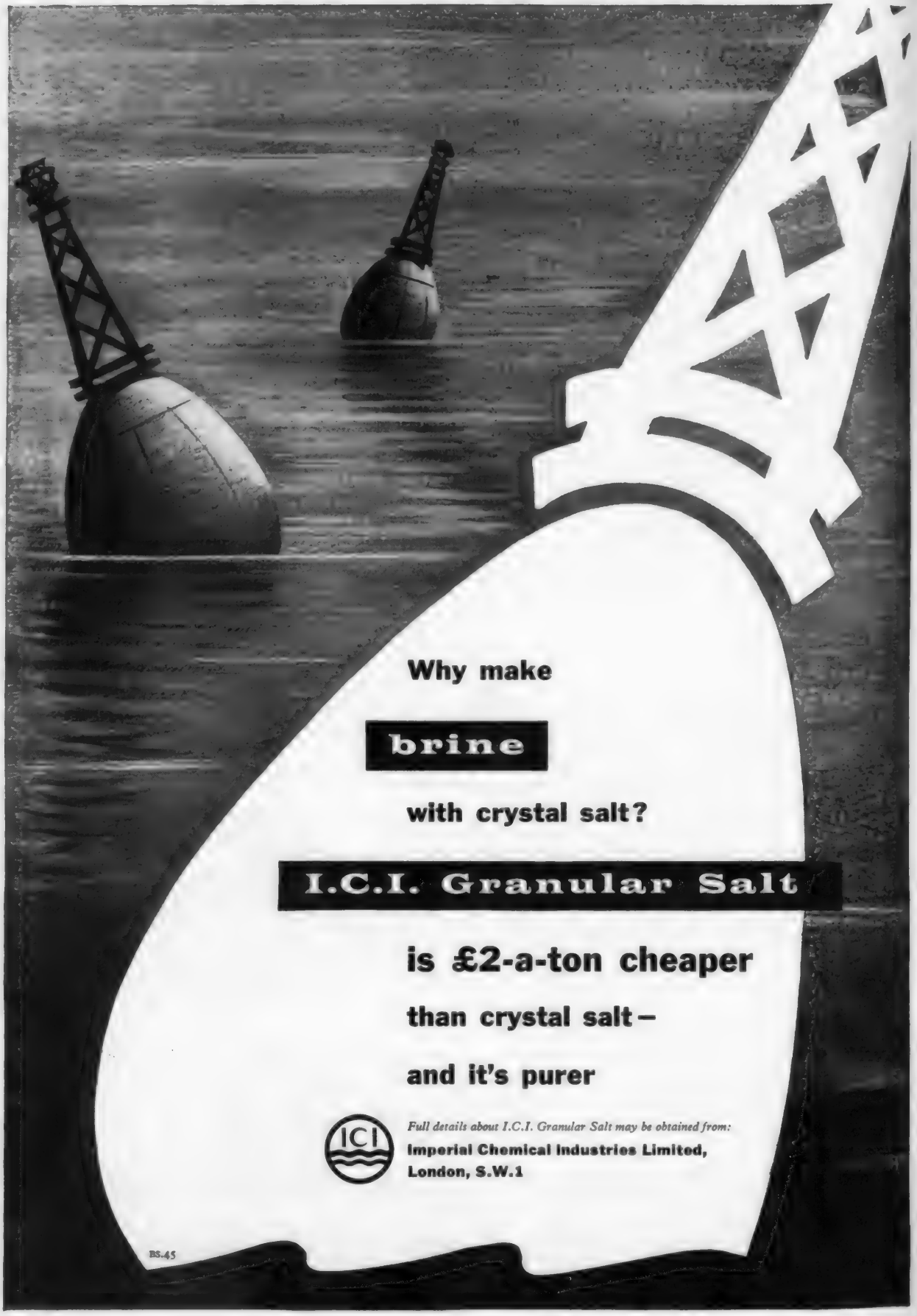
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with crystal salt?
I.C.I. Granular Salt
is £2-a-ton cheaper
than crystal salt—
and it's purer
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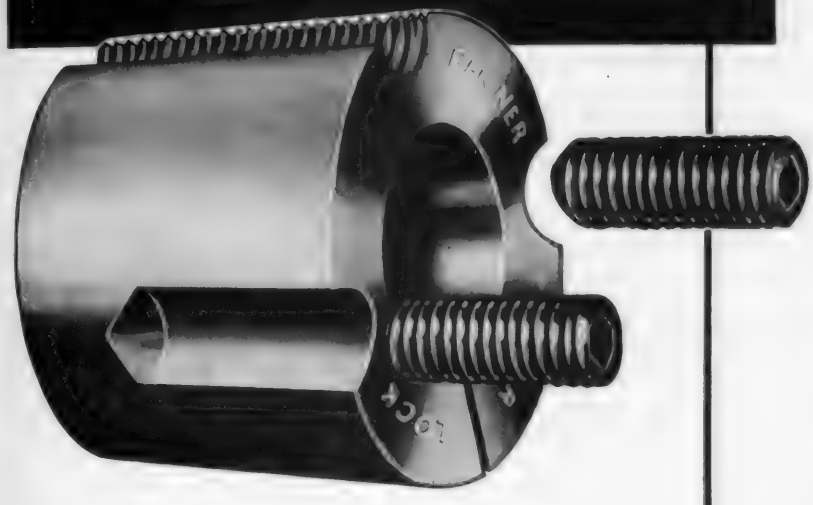
500,000 without a failure!

Taper-Lock has already revolutionised engineering practice. Fitting a pulley to a shaft no longer requires laborious key filing and 'trial and error' methods. Taper-Lock gives a vice-like grip simply by turning two screws.
Ask your nearest Fenner branch about Taper-Lock. A Fenner engineer will explain this 'one minute revolution' and how it applies not only to V-Belt Pulleys but also to chain sprockets, flexible couplings and weld-on hubs—with the same, interchangeable bushes.



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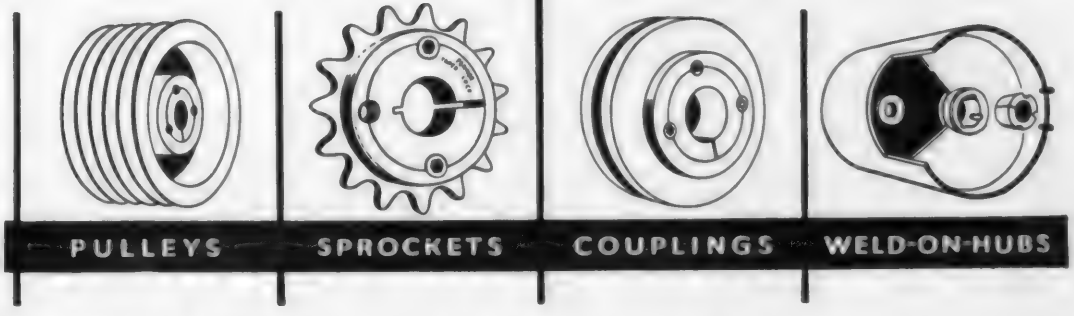

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LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

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- Fractional horsepower motors 1/20—1 h.p.
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'ENGLISH ELECTRIC'

f.h.p. motors

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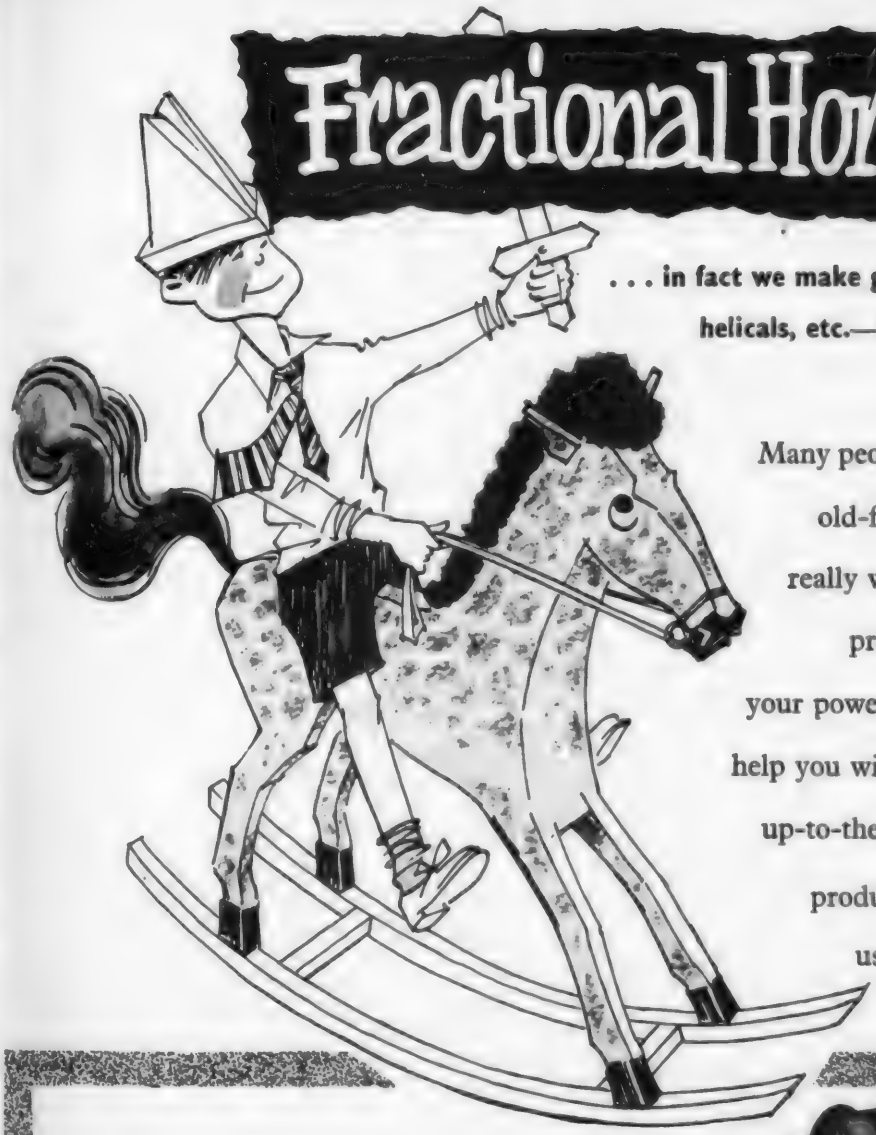
. . . in fact we make gears of all types—worms, double helicals, etc.—for powers up to 3,500 h.p.



Many people are content to jog along with old-fashioned methods. But if you really want to get somewhere with your production drive, you must put your power properly to work. We will help you with our unrivalled range of up-to-the-minute power transmission products. Please get in touch with us or your nearest Crofts Branch.

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from fractional up to 80 h.p.

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UNNECESSARY FATIGUE and loss of production were caused by radiant heat and excessively high air temperatures in the Wafer Department at W. & R. Jacob & Co. (L'pool) Ltd. Colts were consulted and a detailed ventilation survey proved that whilst more than sufficient extract ventilation already existed, this was unable to function properly owing to inadequate inlet air supplies. Five Colt Inflow Units were recommended as these would supply the inlet air necessary whilst at the same time the main cooling effects of the air movement provided would off-set the discomfort caused by radiant heat.

This is the most recent of nine separate Colt Ventilation contracts so far completed for this company, all of which have been highly satisfactory.

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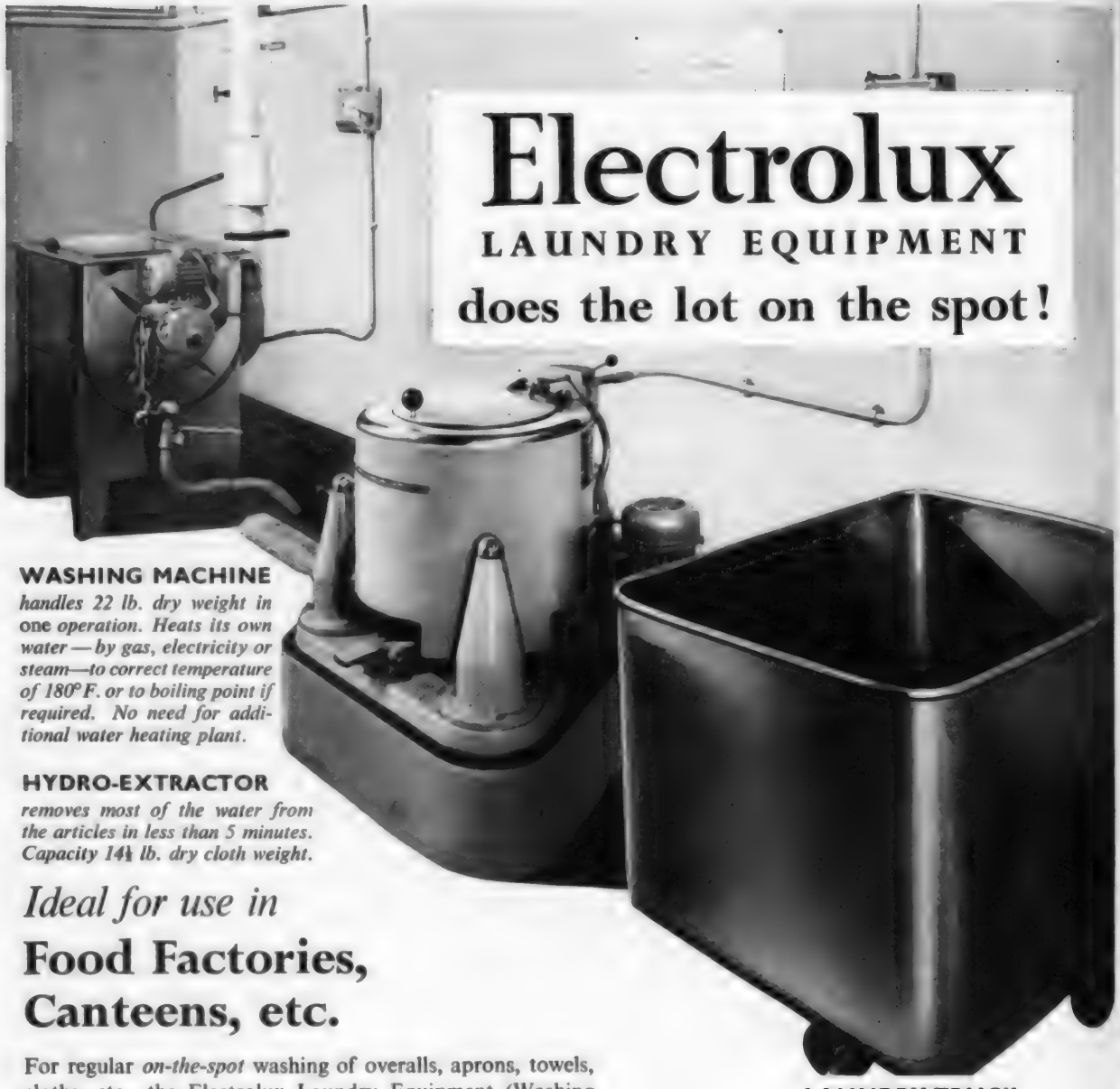

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LAUNDRY EQUIPMENT

does the lot on the spot!

WASHING MACHINE
handles 22 lb. dry weight in one operation. Heats its own water — by gas, electricity or steam — to correct temperature of 180° F. or to boiling point if required. No need for additional water heating plant.

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removes most of the water from the articles in less than 5 minutes. Capacity 14½ lb. dry cloth weight.

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Ideal for use in

Food Factories, Canteens, etc.

For regular *on-the-spot* washing of overalls, aprons, towels, cloths, etc., the Electrolux Laundry Equipment (Washing Machine, Hydro-Extractor, Laundry Truck):

- **provides a high temperature wash — at boiling-point, if required.**
- **reduces handling.**
- **saves delay in turn-round of work.**
- **reduces wear-and-tear.**

Good reasons why Electrolux Laundry Equipment is used by progressive Food Manufacturers.

Electrolux Laundry Equipment is designed for heavy duty and long life . . . it is a sound investment. The average person can easily use it after a short instruction.

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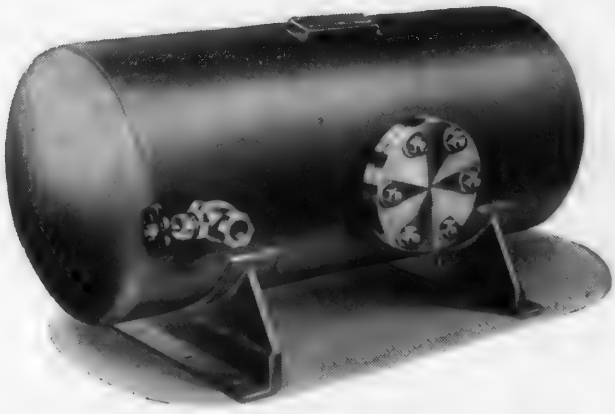

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Stainless Steel is now so firmly entrenched in the round of industrial production . . in the processing and storing of liquids or powders . . as to have no rival and no substitute. But the non-corrosive character of the material itself is not quite all the story where food and dairy products are concerned; interior finish must be perfect, all weldings must be so smoothed as to take a mirror-polish if required. It is here that Butterfield craftsmen match fine material with first rate workmanship.

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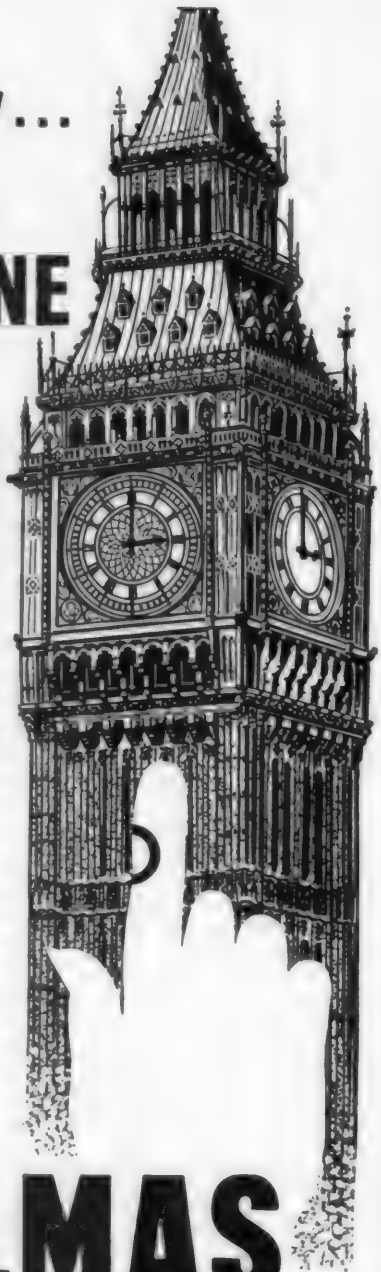
THE LAW...

FOOD HYGIENE AND *YOU*



The Food Hygiene Regulations require that food handlers *must* COVER CUTS & GRAZES WITH A WATER-PROOF DRESSING to prevent contamination of food.

Dalmas dressings are completely Waterproof and antiseptic, flex with every movement, yet stay put in every position. Available in assorted sizes. Be safe with Dalmas.

DALMAS

THE FIRST NAME IN FIRST-AID

FROM ALL CHEMISTS

1/- POCKET SIZE

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Write to us direct for particulars of the larger quantity tins available.

DALMAS LTD., JUNIOR STREET, LEICESTER. *Established 1823.*

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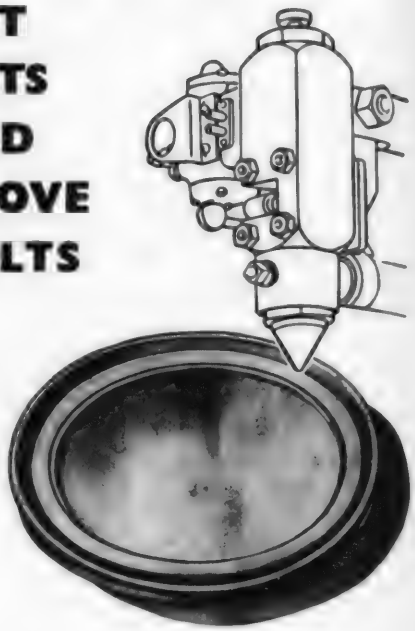
DAREX *Flowed-in* GASKETS

CUT COSTS AND IMPROVE RESULTS



Now! *Flow* gaskets into place at speeds up to 300 per minute. Gaskets become integral with the part—meet a wide range of problem conditions.

SIMPLE APPLICATION. Instead of installing pre-cut gaskets by hand, you merely *flow* a synthetic resin or rubber compound into position (horizontal or vertical surface). After baking, compound becomes solid, rubbery.

IMPORTANT ECONOMIES. You eliminate gluing, crimping, and other time-consuming operations. Save on materials, too.

You can create effective and lasting protection for all types of food products packed in containers.

We shall be pleased to provide you with complete details of "DAREX" sealing compounds and methods of application.

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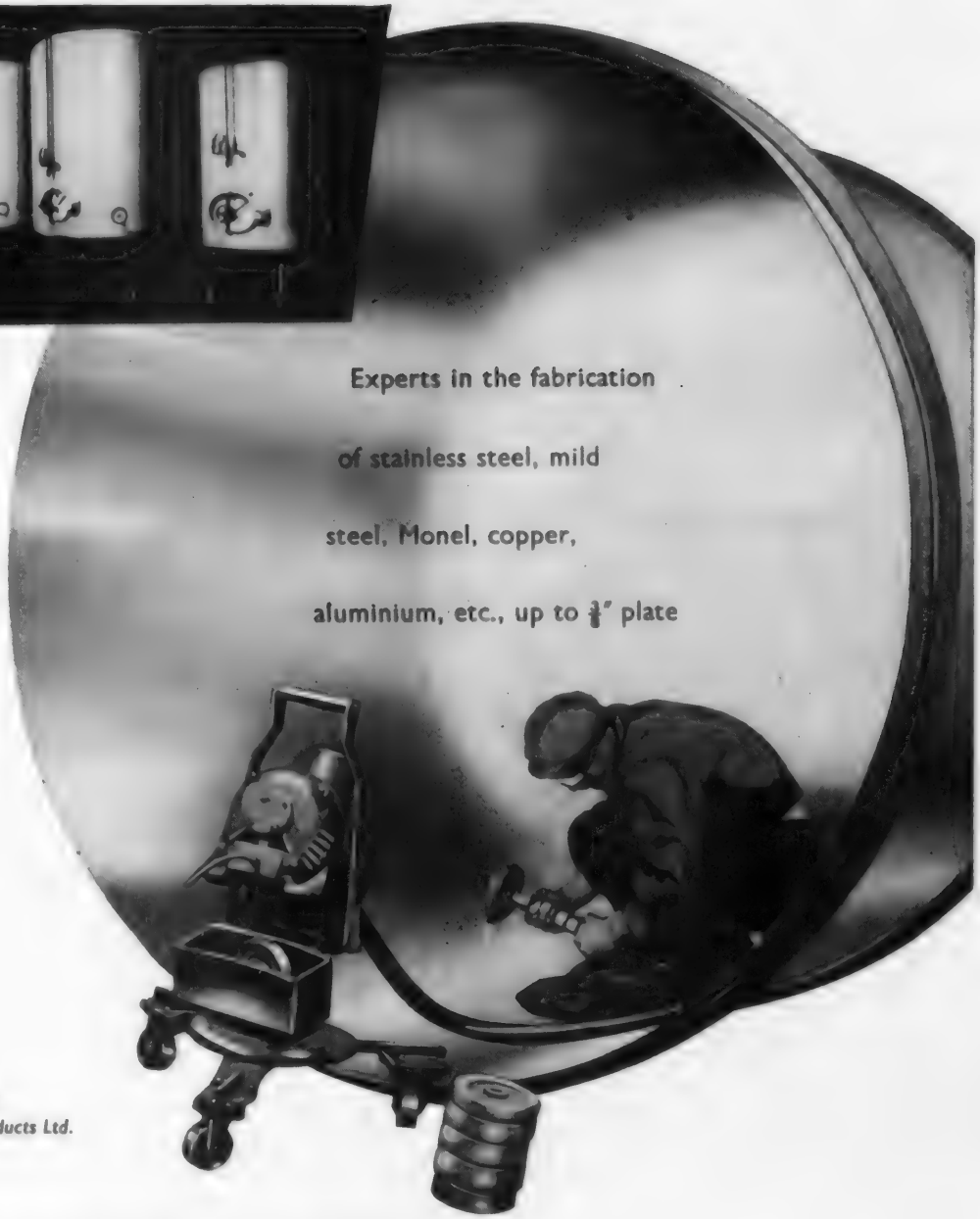

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of canned foods in an autoclave

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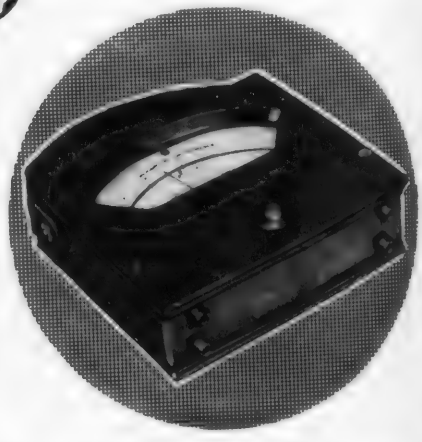

Above: Foster 7 in. Portable Indicator suitable for use with the Needle Thermo-couple.

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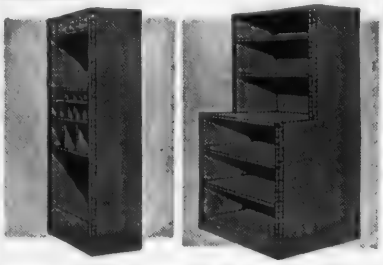

Nominal Standard Dimensions:
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75", 87", 99", 111", 123"
WIDTHS
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DEPTHS
9", 12", 18", 24", 36", 48"

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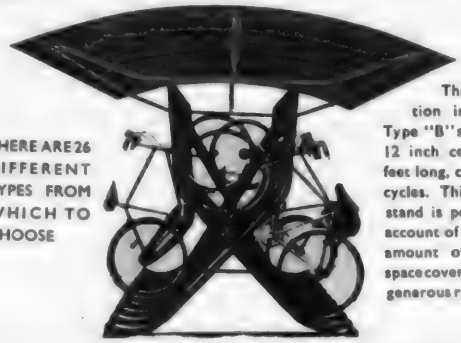
THERE ARE 26 DIFFERENT TYPES FROM WHICH TO CHOOSE



The illustration is of our Type "B" stand with 12 inch centres, 10 feet long, capacity 20 cycles. This type of stand is popular on account of the small amount of ground space covered and the generous roof cover.

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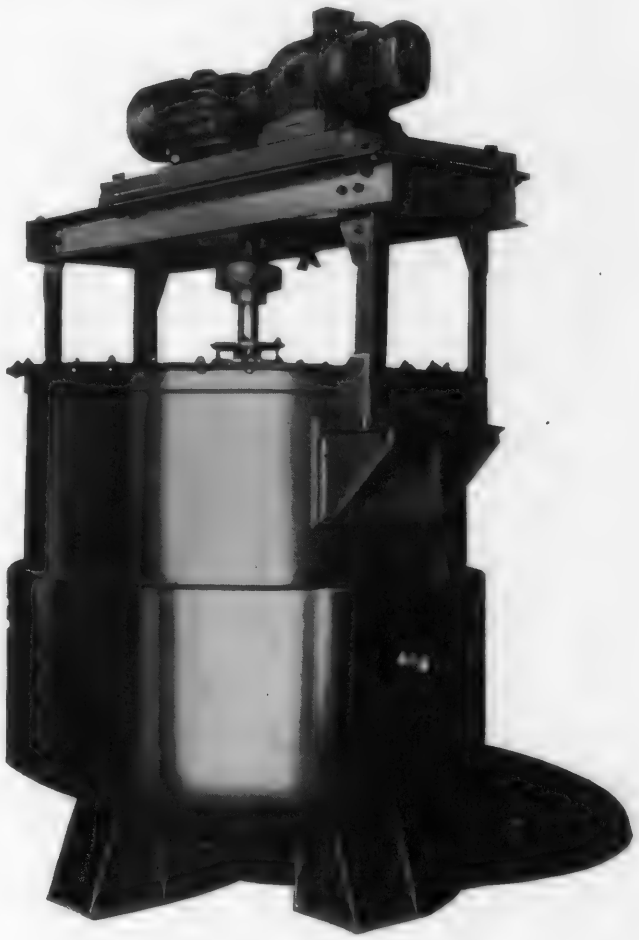

THE illustration shows a Steam Jacketed Mixing Pan 4′ 6″ diameter by 5′ 0″ deep, fitted with stirrer gear operated by electric motor and reduction gear. This type of mixing pan can be made in any size to satisfy special requirements and working conditions. Vessels of the same design are supplied with or without steam jacket, or, alternatively, fitted with internal steam coils.
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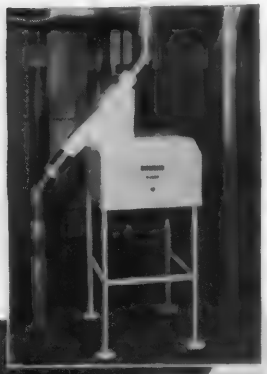

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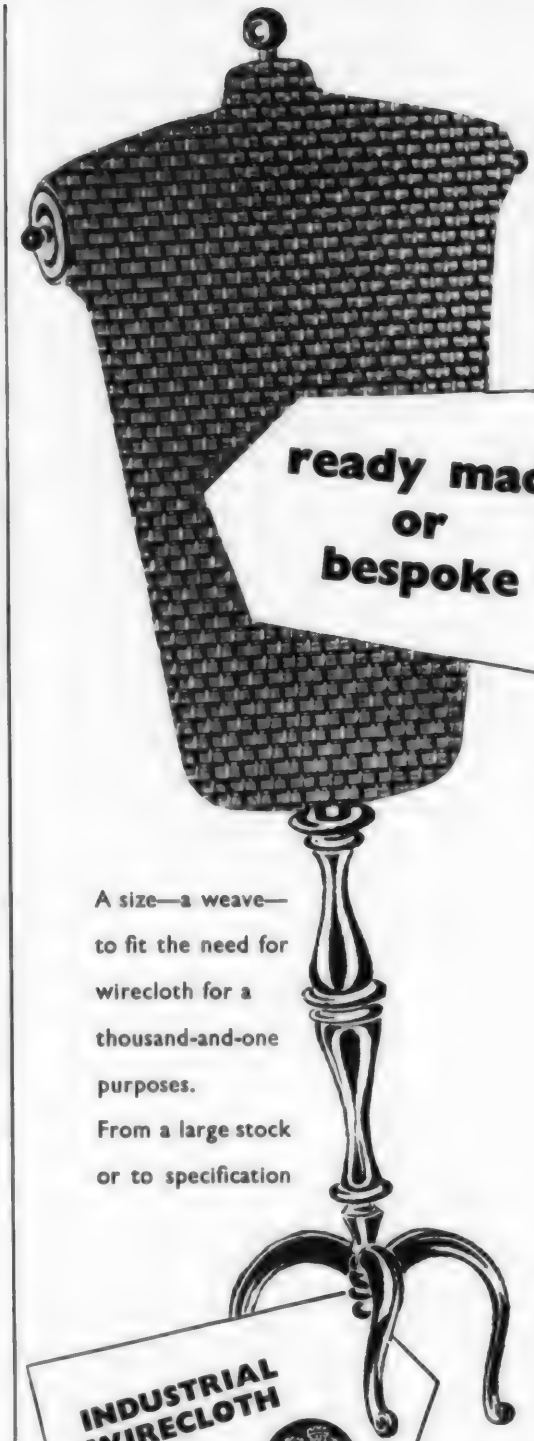

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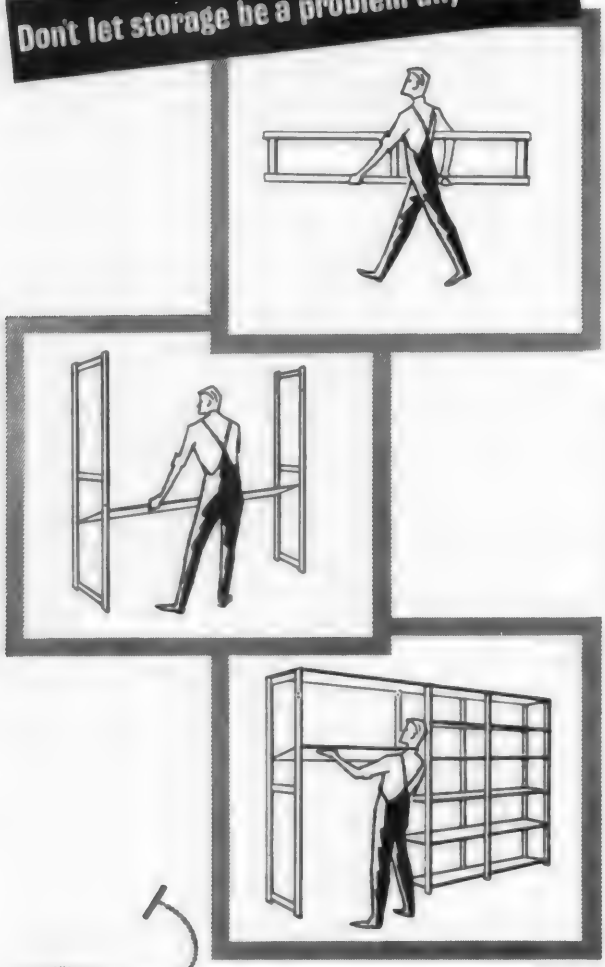

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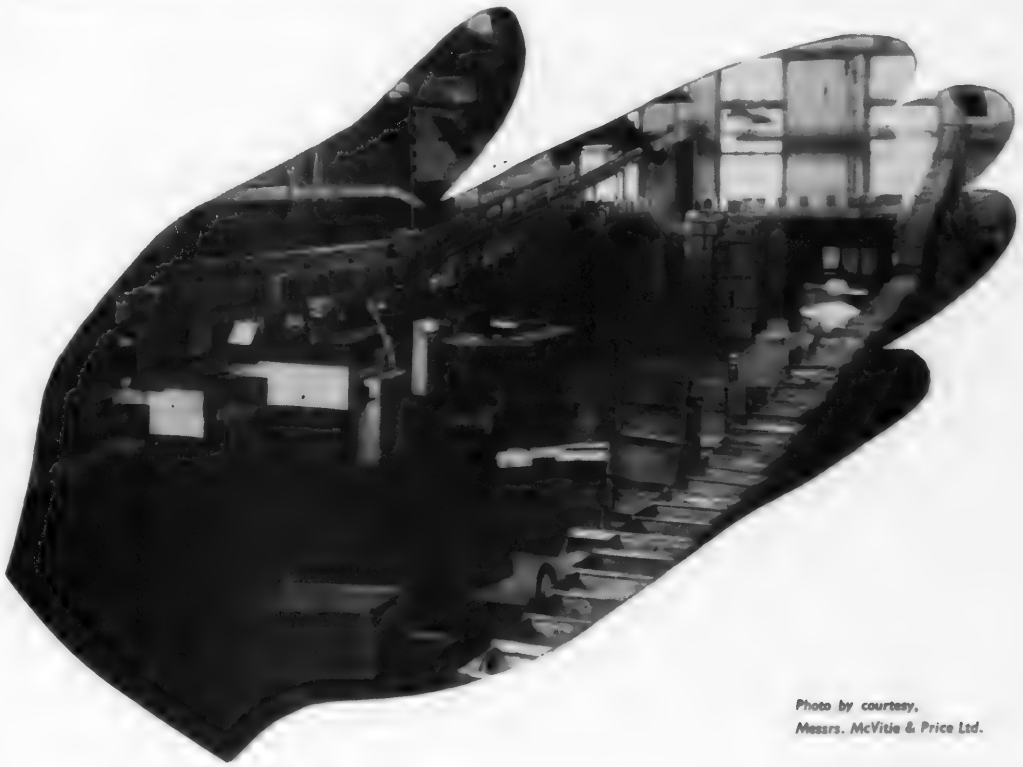

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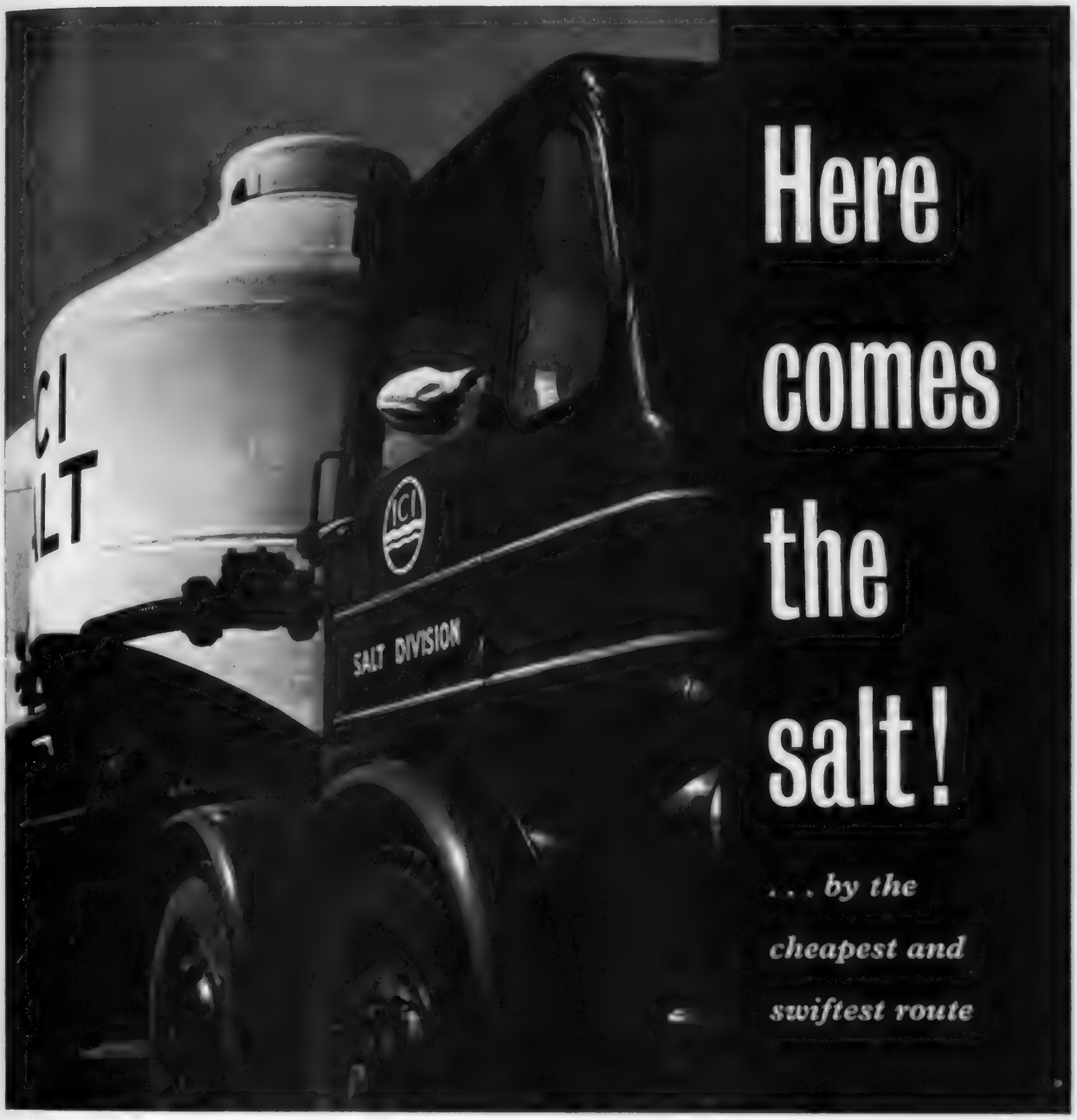

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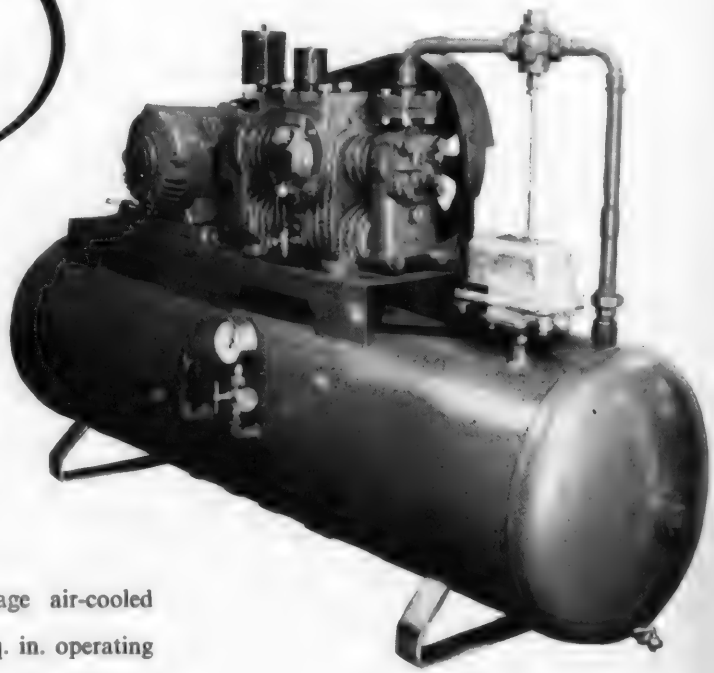

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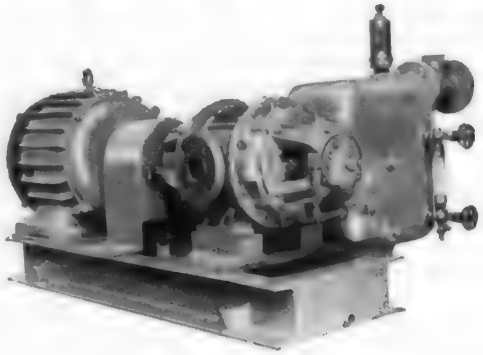

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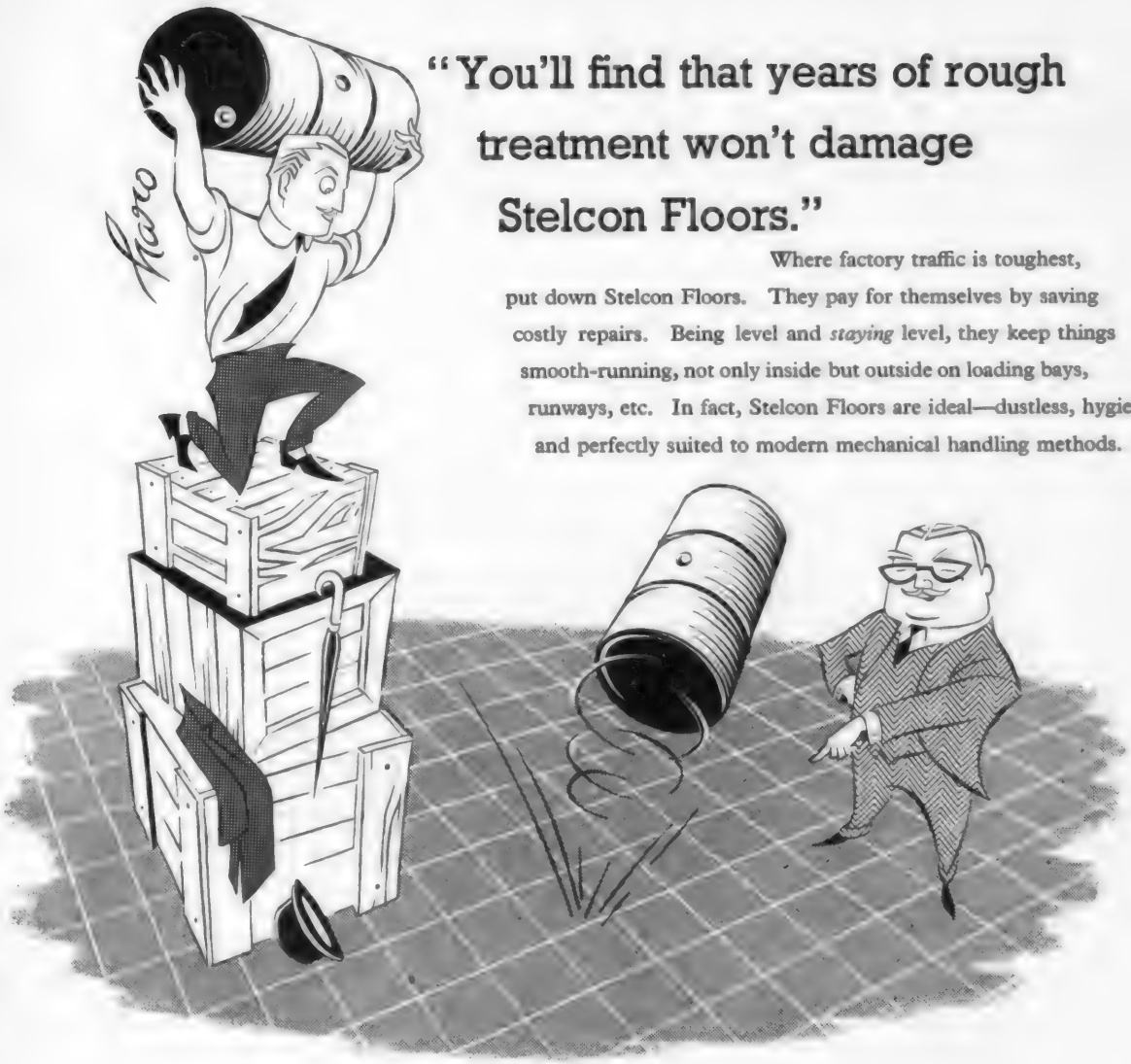

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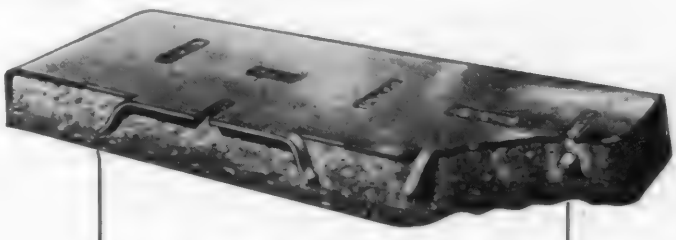

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FOOD MANUFACTURE

Vol. XXXI. No. 10 · Published Monthly · October 1, 1956

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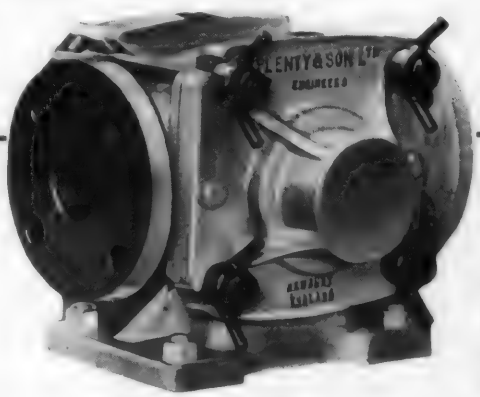
"Easiclean"



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COOKING TEMPERATURE is maintained for a predetermined period. This temperature is adjustable to the needs of the process.

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FOOD MANUFACTURE

Vol. XXXI, No. 10 October 1, 1956

Food for a family of five

IN SPITE of the outpourings at the Trade Union Congress designed to buttress the case for abolition of wage restraint, there is no question at all that, judged by food consumption, the average Briton is better off than ever before. Two simple sets of figures prove this. T. Schulz, in the Oxford University Institute of Statistics *Bulletin*, calculates that the weekly cost of a nutritionally adequate diet for a family of five—husband, wife, and three children—in the spring of this year was £3 12s. The National Food Survey Committee states that *two years previously* this same family was spending £4 10s. a week on food. Since wages have risen since then it is obvious that this family is now spending, or could afford to spend, even more on food.

Eating slightly less meat, cheese, and bread than Schulz recommends, the family of five in 1954 ate a great deal more eggs and bacon. A good deal less margarine than Schulz suggested was eaten but, on the other hand, this family got through nearly 1 lb. of butter a week, while butter is not included at all in Schulz's dietary. Generally speaking the average family consumed slightly less of the basic animal protein foods, fats, vegetables, cereals and other foods suggested by Schulz, and made up the diet with honey, preserves, treacle, fruit, cakes, biscuits and branded beverages.

According to the Food Survey Committee's report —*Domestic Food Consumption and Expenditure*, 1954 (H.M.S.O., 5s. net)—the level of the British diet in 1954—a year of transition from a national to a free economy—was in practically all respects the highest on record. More of all the main foods was eaten, except cereal products, potatoes and other vegetables. The principal rises were for meat (12%), total fat content of oils and fats (7%), and sugar and syrup (8%). Declining consumption of cereals and potatoes, which are cheap sources of energy, is associated with a rising standard of living. Slightly less meat, vegetables (except potatoes) and cereal products, and considerably less fish and butter were being eaten in 1954 than before the war, but consumption of practically all other foods had risen and the calorie intake had increased in all cases.

Competition and costs

BAD as it has been, the weather is not worrying canners so much as the growing intensity of competition among themselves and from the quick-freezing industry, and the burden of rising costs.

Competition will soon reach its peak and may relax during the next year or so, partly as a result of its own suicidal severity and partly because production is outstripping demand. At the beginning of the last season about half of the 1955 increase of fresh peas—about 8,300 tons—were still stocked by canners. With the production of a more than sufficient quantity, quality will be the deciding factor and some canners may find it extremely difficult, if not impossible, to remain in business.

The problem of growing costs does not make it easier for any canner to keep solvent. Since last year labour costs have risen by about 10% and the price of cans by 11½%. Transport, sugar and other costs are also higher. Casual labour costs are almost prohibitive.

Under these circumstances the only answer is more mechanisation and, where possible, more automatic control of all processes from harvesting to labelling. Mechanical handling techniques on farms can achieve in 10 min. what previously required an hour; hydrostatic sterilisers eliminate the jams caused by faulty cans collapsing under pressure; electronic devices speed up and save labour used for inspection and grading. One company is reported to have 140 electronic pea-sorting machines which can sort 4,200 peas per second, with a final check from hand-pickers.

More mechanisation, leading to complete automation, seems the only answer to the problem of rising labour costs.

Wot, no complaints?

FOOD and catering in the Forces have always been regarded as fair targets for criticism, and it was no surprise when the Select Committee on Estimates found fault with some of the ways in which the Services buy, store, distribute and serve food. They nosed out a number of arrangements which they found "rather quaint," particularly the way in

which ships supplying food to the Navy and the Army in the East pass each other in opposite directions somewhere between Malta and Ceylon.

These anomalies will be expected by anyone familiar with Service life. What does surprise one is the Committee's claim that servicemen complain about their food little more than civilians. What has changed since the war? Is Service food indeed better or are soldiers so much meeker?

"Automation Progress"—purpose and policy

AUTOMATION is the goal not only of the canning industry but of the vast bulk of the food industry. The task of producing large quantities of products of uniform quality at low unit cost is obviously one which eventually must require all the technical resources implied in the word automation. Many automatic production and control devices and techniques owe their development to the special needs of the food industry. Electronic metal detection is one. Automatic process control of edible oil refining is another. The bulk handling of flour is another. These are parts of the pattern of automation. This much-abused word, it should be pointed out, does not mean a magical new process or trick which can transform any factory overnight into a robot plant. What it means is the gradual substitution of electronic, pneumatic, hydraulic, mechanical and electrical devices for human organs of decision and effort. The phrase "organs of decision and effort" demonstrates the difference between automation and mere mechanisation. Of course the two developments are inseparable. It is easy enough to prove that we have had both for hundreds of years. But no one would dispute that progress towards automation has accelerated tremendously within the past ten years.

It was this assessment of the situation which led the Leonard Hill Technical Group, of which FOOD MANUFACTURE is a member, to lay plans for their new journal, *Automation Progress*, the first issue of which appears this month (October). The very title —*Automation Progress*—shows the publishers' cautious yet realistic approach to the subject. No attempt has been made to exploit the current popular appeal of the word with the implication that here is a new industrial nostrum that will soon have us all working a two-day week. The view is taken that the world is progressing towards complete automation, that its development must inevitably be uneven as between industries and countries, and that there are, of course, human activities which can never be replaced by instruments and machines. For man must always be the supreme arbiter. No computor, however many valves or transistors it possesses, can be cleverer than the men who made it and it can never do anything but what it is told to do by its operators.

The development of automation depends in large measure on managers and scientists in one industry learning from their fellows in another. A clearing house of information is needed and this is precisely the function performed by *Automation Progress*. It is quite wrong to imagine that automation is possible only in large factories and organisations. On the contrary, some of the latest developments have made it easier for smaller firms to compete with the giants. This is why *Automation Progress* constitutes an essential information service for managers, engineers and technologists in all manufacturing concerns. It enables them to see the widening panorama of automation broadly and in detail. It shows them how to plan for flexible yet rationalised production by explaining in practical terms how other industries are solving similar problems.

Specimen copies of *Automation Progress* and subscription forms are now available from The Circulation Manager, Leonard Hill Technical Group, Stratford House, Eden Street, London, N.W.1. This journal deserves the support of industry because of its clear and direct approach to one of the great problems of our time.

Frozen foods: 400 varieties

THE reasons for the mounting popularity of frozen foods in Sweden was explained in FOOD MANUFACTURE last year (June 1955, p. 237) in the article on the Findus organisation. Figures now published by the Swedish Home Research Institute, and the Swedish Bureau for Frozen Foods show that the frozen foods industry in Sweden is probably the best developed in Europe today. More than 400 varieties of quick-frozen foods can be bought there. Last year between 10,000 and 11,000 tons of quick-frozen foods were sold in Sweden and already this year the consumption is calculated to rise to between 16,000 and 17,000 tons. To the commercially produced commodities can be added at least 25,000 tons of home-frozen foods.

Much of the credit for this must go to the Swedish Bureau for Frozen Foods, affiliated to the Academy of Engineering Sciences, who have been encouraging research by commercial organisations and official research institutes and stimulating demand by widespread propaganda and information campaigns. Films, lectures and cooking classes have been held all over the country and several hundred thousand copies of free pamphlets on cooking frozen foods have been issued.

Frozen products include chickens, a wide choice of vegetables, berries, juices, dough and bread and

above all fish and shrimps. A number of ready cooked dishes are available but Swedes seem to prefer the uncooked foods, which everyone can season and prepare according to his own taste. Exports go mainly to Britain and East Germany though big sales are made to nostalgic Swedes and others in the U.S.A. Swedish fish is popular in East Germany. Baltic herring for example, a well-known Stockholm delicacy under the name *strömming* is deep-frozen and exported to East Germany at a rate of some 1,500 tons annually—not to be retailed as such but to be canned. Except as salt-fermented (*surströmming*), this fish is never canned in Sweden; the domestic demand for deep-frozen fillets is so great that the few specially built filleting machines available are kept working day and night. The producers, a co-operative Stockholm society, have quintupled their sales in a few years, and would export—*e.g.* to Holland and Switzerland and to Swedish restaurants in the U.S.—if their capacity would only permit it. However, they do hope to expand next year.

The elusive fish

THE RIDDLE of the migrations and movements of fish in the Mediterranean which has baffled man since the Phœnicians caught tuna along its shores, may be solved if plans proposed by the General Fisheries Council for the Mediterranean are successfully operated.

A thorough investigation of fish populations in the Mediterranean, the migrations and life cycles of various species and a study of Mediterranean trawling grounds has been suggested.

"It is a strange fact," comments Mr. M. J. Girard, the secretary of the council, "that although man has been fishing in the Mediterranean for thousands of years, we are to a great extent ignorant of what happens to some of the most important species of commercial fish. For example, we know that tuna appear in certain parts of the Mediterranean at certain times of the year, as they have done since the days of Nineveh and Tyre. Fishermen are only able to fish for a few months, then they disappear for the rest of the year. We are faced with similar riddles in connection with other fish."

The council does not itself undertake investigations or research work, but promotes co-operation in fisheries work between Mediterranean countries. For example, the investigation of tuna, sardines and other commercial fish could be better done if the nations concerned agreed on a co-ordinated investigation programme, or even a co-operative programme.

An example of how a resource can exist undetected for thousands of years is to be found in the recent development of the Mediterranean shrimp fishery. Until comparatively recently shrimp fishing was of little importance in the Mediterranean and some people believed that there were no worthwhile shrimp stocks. But now trawlers working from Algeria, Egypt, Italy and Turkey are exploiting substantial stocks of big, excellent-quality shrimps and the fishery has rapidly developed.

Cult of personality

"SUBSTANTIALLY HIGHER sales in the Americas" are attributed by the chairman of Schweppes to the efforts of Commander Edward Whitehead, executive director of Schweppes Overseas, Ltd., and president of the company's American subsidiary. Sales figures are kept secret, but we are told that Schweppes now have 20 bottling centres and 110 distributing points in the U.S.A. and 5 bottling plants in Canada. It seems an extraordinary achievement. However, it is not entirely due to the efforts of one man but rather to the shrewd exploitation of what our eastern comrades call the "personality cult." His magnificent naval beard, rich voice and imposing presence have made the Commander a national institution in America, almost as well known as Elsie Borden, the cow invented by the Borden Milk Co. But where Elsie has a sentimental appeal, Commander Whitehead, as an advertising symbol, has an artfully cultivated snob appeal which counts for a lot in a country where whisky is sold by Men of Distinction.

Schweppes' main task was to stress the quality of their tonic water or, as it is known in the States, quinine water. They had been exporting this product to the U.S.A. and other markets for over 100 years in bottles which were too expensive for all but those with high incomes. Soon after the war the company decided to tackle a wider market by exporting the basic essence and bottling abroad. In America this is done by arrangement with the Pepsi-Cola Co., who buy the essential flavouring from Schweppes and sell it in the form of syrup to members of its chain of distributors for bottling. This has cut the price from 40 cents to 18 cents a bottle, but it has had its critics, who prophesied that Americans would never credit the home-bottled product with the same quality as that bottled in Britain. Schweppes' tonic water had a high reputation—their task was to keep it high and at the same time to achieve higher sales.

Commander Whitehead's Savile Row clothes, his aristocratic nose and, above all, his wonderful beard, provided Schweppes' advertising with an impetus which the public have themselves kept going. The Commander's personality has been beamed from coast to coast with an immense amount of free publicity on television, radio and in magazines. Thus he has sold a very great deal of his company's goods.

Flavouring enzymes

BY MEANS of a flavour-generating enzyme system, previously unobserved, the natural flavour of foods can be restored after processing. This claim was made recently by chemists of the U.S. Army Quartermaster Research and Development Command, who, together with members of Evans Research and Development Corporation of New York, recently undertook the preparation of an enzyme extract that could duplicate the natural process of flavour improvement.

According to the team, the natural flavour of raw cabbage can be restored to dehydrated cabbage by treating it with water and an enzyme preparation made from mustard seed. In addition, they report flavour improvements in such diverse processed foods as peas, spinach, pineapples, tomatoes, oranges, bananas, strawberries and dried skimmed milk.

Mustard seed is not the only source of flavour-creating enzymes. A botanical relationship between foods is a significant factor in the preparation of suitable enzyme extracts. This relationship explains why an enzyme system extracted from mustard seed works equally well with both cabbage and watercress. It is emphasised that to be suitable the different foods must be rich in flavorese (flavour creating) enzymes. The method may be of some use in correcting the off-flavours given to foods by cold sterilisation.

Men and management

WHERE DO managers come from? How are they picked? What qualities should they have? How should they be trained? These questions are answered by Unilever in a report to stockholders.

Unilever employs about 22,600 managers out of a total payroll of about 270,000, *i.e.* about 8% of the total. The proportion of managers to staff varies, of course, from about 3% of the total labour force in Nigeria and the Cameroons, where both the markets and the operations are still relatively simple, to 15% in the highly sophisticated conditions of the U.S.A., where Unilever's interests include foods, oils and fats, detergents, and toilet preparations.

There are no arbitrary rules for selection. Merit is the sole test of a man's suitability. Many candidates have had a university education, but this is by no means essential and promotion from the ranks is encouraged. Candidates for the higher grades are assessed not only by individual interview but by performance in a group which allows them to display such qualities as intelligence, commonsense, organising ability and the ability to get on with others.

The potential manager is not subjected to a general scheme of training into which everyone must fit. As soon as possible he is given a job in which his performance is watched and guided by his seniors.

Mr. Smith's success story

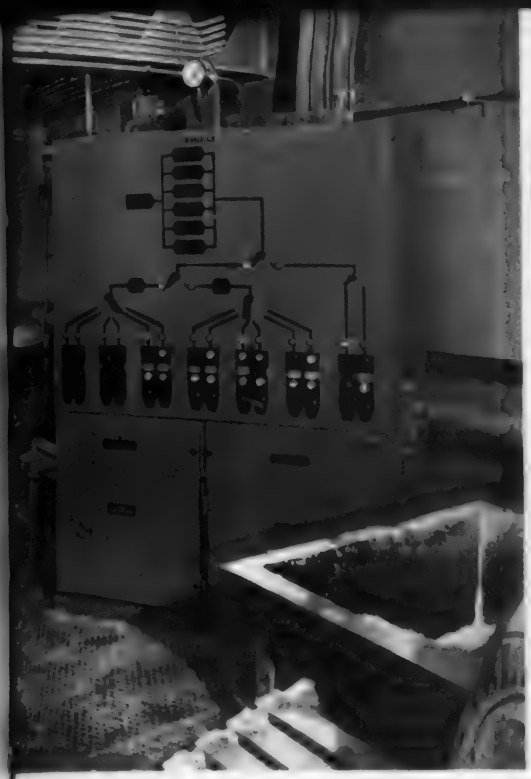
MANY MEN have started successful careers in their youth. Few have waited until middle-age to strike out in an entirely new field and make an overwhelming success of it. One of this rare breed is Frank Smith, who recently retired from the managing directorship of Smith's Potato Crisps, Ltd., at the age of 81, after 36 years of sustained and single-minded effort during which his idea has grown from nothing to a vast organisation of 15 factories and eight depots all over the country.

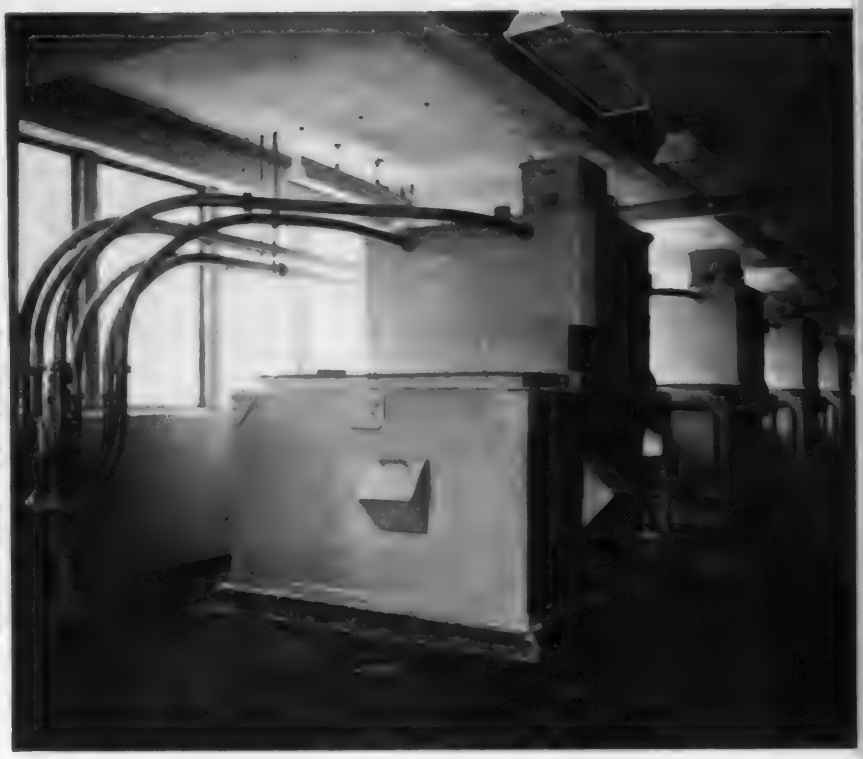
It was in 1920, after working for over 30 years in the grocery trade, that Mr. Smith set out to make and popularise potato crisps, then known as Continental game chips. His premises were behind the Crown Hotel in Cricklewood, North London, and he had a staff of 12. Nine years later the business was converted into a public company with a capital of £325,000 and in 1930 was moved to its present location in Brentford. Today Smith's Potato Crisps employ a staff of 3,000 to produce between 11 and 12 million packets of potato crisps per week, and run a fleet of nearly 200 vehicles. They have two factories in Australia. In Lincolnshire, Smith's Potato Estate, which produces about 25% of the company's requirements, covers 8,000 acres and is equipped with 26 miles of light railway. Last year the company paid shareholders a total dividend (including a bonus) of 37½%. In each of the past three years there has been a share bonus and the cash bonus and dividend has been held at 32½% for the past 18 years.

The tiny profit margin—less than ¼d. per 4d. packet (the original price was 2d.)—made it imperative for the company to expand to survive, and to continue expanding. Owing to its large bulk and low price a tin of crisps holding 18 one-ounce packets cannot be profitably carried far, and to sell on a national basis it is essential to have factories and depots all over the country served by a well-organised transport system. The company is already considering the erection of another factory in the Midlands.

There is no great secret to Mr. Smith's success. He aimed to make crisps popular with the public and profitable to his company. He achieved both objectives by dogged hard work, economical production and consistently high quality. At first all the work was done by hand, then gradually machines were adapted —practically all Smith's plant is developed and assembled by their own engineers—until now most of the manufacturing and packaging operations have been mechanised.

A third factor in Smith's success has been the consistent ploughing back of profits into the business—nowadays, unfortunately, an old-fashioned financial policy.





Towards COMPLETE AUTOMATION in Biscuit Manufacture

Huntley and Palmers' new biscuit factory at Liverpool has been called "the half-way house to the completely automatic factory." Automatic control and operation is particularly advanced in the process block, described and illustrated here.

HUNTLEY AND PALMERS went to Liverpool to establish their new factory because of the shortage of labour at their headquarters in Reading.

To get working to full capacity as soon as possible, it was decided to employ only those methods and processes which had been proved in practice at Reading, so that no time would be lost in training new workers in unfamiliar operations, or in experimenting with newfangled equipment, the performance of which might be quite unknown and uncertain. Nevertheless, the opportunity was taken to install plant which, whilst normally controlled manually, could be adapted with little difficulty to a considerable measure of automatic operation. This is particularly true of the process block where the ingredients are stored, dispensed and mixed before going as mixed doughs to the ovens. This article is concerned only with this particular part of the factory.

The process block

Whilst the main building housing the 200-ft. long tunnel-type biscuit ovens, etc., is of single storey construction, the process block has in addition first and second floors where the raw materials are stored and measured.

Flour is consumed at a rate of several tons per hr. Biscuit flour is a complex substance, consisting of blends of various kinds of basic flours, depending on the type or variety of biscuit. As some 40 or 50 kinds of biscuit are now being made, many of which require blends differing in one or other respect, it was necessary to provide a very flexible system to enable any required blend of flour to be made up, delivered, and stored at the position where it was required to be used.

Following a trial installation at Reading, it was decided to use the Henry Simon system of continuous blending, combined with pneumatic conveying of the blended flour. A series of hoppers, into which bags of flour may be tipped, feeds flour at controlled rates into

Above left: **Illuminated diagram and control panel for blending and blowing of flour.** *Right:* **Upper part of flour and powder bins, showing also one of the remote-operated multiway flour distributing valves.**

Lower sections of bin nests showing also the enclosed weighing hopper and dial indicator.

Weighing hopper and dial showing electrical pendant control gear in operation. The ingredient water meter and controls can be seen in the background against the wall.

a blending worm conveyor. After sieving, the flour passes through a special valve into a pipeline through which it is conveyed pneumatically to any one of a number of ready-use bins. The route which the flour takes is pre-selected by setting switches on a control panel situated on the blending platform. An illuminated diagram reproduces the layout of bins, conveying pipes and distributing valves with indicating lights to show not only the route which has been set up, but also whether the bins are full, half full or empty.

Bin arrangement

The ready-use flour bins are arranged in pairs, each pair being part of a nest of bins over each weighing position. The remaining bins in each nest hold other powder ingredients such as oatmeal, cornflour, etc. All bins are conventional, having a rectangular cross section, with a lower tapering portion, two sides of the latter being vertical. At the bottom of the tapered part in each case there is a special pneumatically-operated slide valve, controlled electrically from a push button alongside the weighing machine dial. These slide valves, an exclusive feature of this plant, are small, compact, free from leaks and easy to maintain. They were designed by Griffin, Smith and Partners, consulting engineers to Huntley and Palmers, Ltd., for the process block, and were made by Fearnought, Ltd. The pneumatic operating cylinders, electro-magnetic pilot valves and push button controls were supplied by Baldwin Instruments, Ltd.

Fluidisation

The principle of fluidisation was employed to cause the flour and other powders to run easily out of the bins. Into the short length of chute immediately above each slide valve, low pressure air is admitted simultaneously with the opening of the valve. As a result, the powder flows like a liquid through the valve from the bin into the weighing hopper below. The operator has a pendant control box which carries a selector switch and push button. He selects the required bin and presses the button, watching the pointer on the weighing machine dial. As soon as the required weight has been drawn off, he releases the button, when the slide valve immediately closes. Such is the ease of operation and the effectiveness of the control system that a relatively untrained operator can weigh out 3 or 4 cwt. of flour with an error of less than 0·5% in under 1 min.

The plate of the slide valve is moved by a double-acting differential-pressure air cylinder and is held in the normally closed position by air at a pressure of 40 p.s.i. When the operator presses the "open" button on his pendant control unit, air at 80 p.s.i. is admitted to the other side of the piston, thus providing an opening pressure of 40 p.s.i. The advantages of this arrangement are that there are no mechanical springs to break or get fouled with flour dust, it is extremely easy to provide cushioning at the end of each stroke and finally, in the unlikely event of the air supply failing, it is simple to operate the slide in either direction by hand. Should the electricity supply fail, or an electrical fault develop, it is easy to isolate the air supply and again operate the slide by hand.

Electro-pneumatically operated slide valves and the air connections to the chutes for fluidisation.

This system emphasises the many advantages of the use of electro-pneumatic principles for such intermittently operated mechanisms. They are simple in design and construction, easily maintained and serviced, instantaneous in operation, clean and virtually trouble-free in service.

Weighing hopper

The whole weighing hopper is enclosed in a steel cover in which there is a lifting lid to allow other ingredients to be added by hand as required.

When the complete batch of materials has been collected, a door at the bottom is opened, through which it passes into the dough mixing machine on the ground floor. The liquid ingredients are dealt with separately, having been collected in a container located over a delivery pipe leading down to the mixer below.

The water ingredient is measured volumetrically by positive type meters fed *via* Leonard thermostatically controlled mixing valves with cold or warm water as required.

The arrangements for handling sugar include a large bulk storage hopper with screw conveyors and elevators which take the granulated sugar to the top floor where it is sieved and ground to the required grades.

The remaining space in the process block is devoted to fat storage and processing. A specially heated room contains a large number of storage tanks into which the various oils are pumped from bulk delivery tankers. From any combination of tanks the required quantity of oils may be drawn and blended, after which they are plasticised.

The layout of all plant in the process block was designed by Griffin, Smith and Partners, acting on behalf of the engineering department of Huntley and Palmers, Ltd., in close collaboration with the architects, Huckle and Durkin.

Pair of fat blending tanks showing manifolds with control valves, sight glasses and flow meter.

Sugar handling and sieving platform.

Trace Elements in Food—3. SELENIUM

By C. F. M. Fryd, B.Sc., A.R.C.S., A.R.I.C.

(*Department of the Government Chemist*)

Many plants, including wheat and the other chief grains, take up selenium. Since this element is at least as toxic as arsenic, its presence in food is a potential danger. This is the third article in this series describing methods used by the Department of the Government Chemist to detect trace elements in foodstuffs.

SELENIUM in small amounts is widespread in the primary igneous rocks, but rather strangely is found to a somewhat greater extent in sedimentary rocks and in the soils derived from them. This excess is compensated for by a relative deficiency in sea water, from which doubtless it was precipitated as the sedimentary rocks were being formed. Soils may contain from traces to 30 p.p.m. of selenium; the higher amounts are always associated with arid or semi-desert regions, since accumulations of selenium are carried away by natural irrigation, or by rainfall. A few plants thrive on seleniferous soils,[1] and may accumulate relatively large amounts (up to 1% or more) of the element, and in doing so may convert appreciable quantities of inorganic selenium into a potentially more dangerous organic form. Such plants are acutely toxic, but normally have an offensive odour which makes them quite unlikely ever to find their way into human food; there is, however, some suggestion that this odour is due for the most part to tellurium, which is frequently but not necessarily an accompaniment of selenium in the soil.

Many other plants, including the chief food grains, take up selenium more or less incidentally, the absorption being to some extent in inverse ratio to the amount of sulphur available.[2] Such plants often contain as much as five to six times as much selenium as is present in the soil on which they grow.[3] Since selenium in food is at least as toxic as arsenic, this means that soils containing 0·5 p.p.m. or more of the element must be regarded as potential sources of danger. Samples of wheat from many supposedly non-seleniferous parts of the world have been found to contain from 0·1 to 2 p.p.m. of selenium,[4] but much of this is stated[5] to be eliminated in the bran during the milling process.

In addition to its presence naturally, selenium may be introduced into the soil or into vegetation either deliberately, as when seleniferous insecticides[6] are used especially in greenhouses for the control of red spider and the like, or accidentally in fertilisers, or as dusts or fumes from processes of manufacture. World production of elemental selenium is about 1 million lb. annually, almost solely as a by-product from the working-up of anode slimes in electrolytic copper refineries. Since it is used widely in the manufacture of pigments, electronic equipment, ceramics and glass, and iron and steel, possible sources of distribution are many.

Sampling

Few special precautions are necessary when sampling foodstuffs containing selenium. Samples may conveniently be transported in glass bottles, metal caps being avoided to prevent possible loss as metallic selenides. Analysis should take place before any considerable decomposition of the sample occurs, as any evolution of gaseous products is likely to be accompanied by loss of the element. If the source of selenium is thought to be the soil on which the foodstuff was grown, care should be taken to keep the various plant parts (stem, leaf, seed, etc.) separate or to ensure a fair representation of them. If the selenium is thought to have come wholly or in part from outside sources it is obviously necesary to ensure a fair proportion between, *e.g.* outside and inside leaves. Selenium present as dust on the surface of plant materials may readily become detached, especially as drying occurs. The whole sample, including any dust in the bottle, should be dried at low temperatures, ground, and a weighed portion taken in as representative a manner as possible.

Procedure

The determination of selenium once it has been brought into solution in the inorganic form presents little difficulty, since the compounds of the element may readily act as oxidising or reducing agents or may themselves be reduced to elementary selenium, which may be measured optically or gravimetrically. The preliminary destruction of organic matter, however, must be carried out with some care since some organic and inorganic compounds of the element are readily volatile, and these may be formed if reducing conditions even momentarily prevail during the reaction. The use of mercury in solution as mercuric salts in the oxidising mixture is recommended by many authorities,[7] and experience in the Department of the Government Chemist confirms its value. Its effect is to speed the reaction and to prevent loss of selenium, but whether by acting as an oxygen carrier or by temporarily forming mercuric selenide whenever reducing conditions occur is not clear.

The methods used in the Department of the Government Chemist follow those described in

detail in the Official Methods of the Association of Official Agricultural Chemists, in which wet digestion of the sample with nitric acid and sulphuric acid in the presence of mercuric salts is followed by distillation of the selenium as the volatile bromide. After reduction to the element by sulphur dioxide in the presence of hydroxylamine, the selenium is oxidised to selenious acid and estimated by titration with sodium thiosulphate, a back titration of the excess added being carried out with standard iodine solution.

Certain minor modifications to this procedure have been made in our laboratory. It is our experience that appreciable blanks may be introduced by traces of selenium in the sulphuric acid used.

We have found it advisable to adopt the procedure of diluting the acid with an equal volume of water, cooling, treating the dilute acid with about 5% of its volume of a solution of 1 part of bromine in 100 parts of 20% hydrobromic acid, and finally heating the mixture until fumes of sulphur trioxide are evolved. Again, the final titration in the A.O.A.C. method takes place in a special titration apparatus consisting esentially of a tube 1 cm. in diameter. Our experience is that some difficulty is met with in mixing the contents of this with the thoroughness and rapidity necessary for titrations involving N/1,000 sodium thiosulphate and iodine solutions. We have therefore modified the method to the extent that titrations are carried out in a 50 ml. Erlenmeyer flask into which a side tube has been inserted, and into the neck of which a small thistle funnel carrying an inserted disc of sintered glass has been ground (Fig. 1).

It is occasionally necessary to determine selenium in certain inorganic materials which may be used in the manufacture of foodstuffs, such as sulphur dioxide, sodium bisulphite, or acid phosphates of calcium. The A.O.A.C. method may be used with the omission of the preliminary oxidation step.

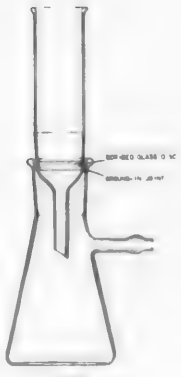


Fig. 1.

Special methods and recent developments

A criticism of the A.O.A.C. method has been that it is unnecessarily time-consuming. Kahane and Korach[9] describe a rapid method suitable for quantities of from 3 to 30 mg. of selenium in which the seleniferous material is oxidised with a mixture of nitric and perchloric acids in a small flask provided with a cooled bubbler containing water. Part of the selenium remains in the flask and the rest is entrained in the water in the bubbler. The solutions are bulked and the selenium, after reduction with sodium bisulphite in strong hydrochloric acid solution and conversion to the black modification, is weighed as the element. An accuracy within 0·5% of the amount of selenium present is claimed on many organic substances; but it appears likely that low results would accompany use of this method for either very resistant or very volatile compounds.

Wurzschmitt and Zimmerman[10] have also put forward a rapid method of determining selenium in micro or semi-micro quantities (down to about 30 mg. of sample). They oxidise the material in a bomb of pure nickel by means of a mixture of sodium peroxide and potassium nitrate, a small amount of powdered sugar being added as fuel. Again the selenium is reduced to the element and weighed as such. The authors do not recommend the method for true micro-analysis.

As mentioned already, much of the offensive smell (although not the toxicity) of organic substances containing selenium is thought to be due to tellurium associated with it. Burstall *et al.*[11] describe a chromatographic method for the separation of microgram quantities of these elements. A solution of the elements as selenites and tellurites in dilute nitric acid is spotted on strips of paper which are thoroughly dried and treated with a solvent consisting of 60 parts of dry butyl alcohol and 40 parts of dry methyl alcohol. The chromatographic separation takes place in an atmosphere of which the humidity is closely controlled. Development is carried out by spraying with a solution of stannous chloride, tellurium giving a black and selenium a golden yellow patch. The limit of detection with a strip modified in shape is stated to be about 1 microgram of selenium in 1,000 micrograms of tellurium; and there seems no reason why it should not be of similar order for small amounts of tellurium in selenium.

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▶Packaged poultry and pre-packaged wet fish are two of the topics dealt with in a new edition of the magazine of British Cellophane Ltd. Many other uses for transparent packaging are also included.

Plant Proteins and Vitamin B_{12}

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Most nutritionists concerned with the vast problem of malnutrition and deficiency diseases in the underdeveloped areas of the world are agreed that perhaps the most important shortage is that of first-class animal protein, particularly dairy protein.[1] Wartime stresses led to the replacement, in this country, of a considerable amount of meat (especially beef) protein by the excellent dairy proteins, especially those in milk. The tendency to favour milk rather than beef production still persists in a number of countries, but in many parts of the world sufficient milk supplies are not available and recourse must be made to plant proteins.

In the past few years, large surpluses of certain cereals, especially wheat, have begun to accumulate in some of the major grain-producing areas of the Western hemisphere. Rather smaller surpluses of dried skim milk have also occurred. In any discussion of the overall world protein shortage, these recent local surpluses must naturally be taken into account, and the problem of making plant proteins more nearly equivalent nutritionally to first-class (e.g. dairy) protein is of the greatest importance to East and West alike.

In this problem the possible role of vitamin B_{12} is of considerable interest. The present review deals with developments in this field up to the end of 1955, a year which has seen the complete elucidation[2] of the complex structure of vitamin B_{12} and which may be regarded as a milestone in its short but crowded history.

Dietary deficiency of vitamin B_{12}

DIETARY vitamin B_{12} deficiency has recently been described[3] in volunteers in this country living on diets entirely free from animal foods and termed "vegans." These volunteers did *not* show the typical blood picture of pernicious anæmia, although some of them were definitely suffering from vitamin B_{12} deficiency. Signs of this deficiency included characteristic sore tongues, amenorrhœa and other menstrual disturbances, and changes in the nervous system ranging from paræsthesia to subacute combined degeneration of the cord and other profound changes, including several instances of severe nervous breakdown. There was no shortage of Castle's "intrinsic factor," and these ill effects were removed by administration of animal protein in the form of milk, which is known to be a good source of vitamin B_{12}, and in one or two instances by injection of vitamin B_{12} also.[4] The vegetable foods consumed by the volunteers do not provide significant amounts of vitamin B_{12}.[5] Low serum B_{12} values in the volunteers showed their diminished B_{12} status. Oral administration of the vitamin, which has also been recommended by Lester Smith,[6] gradually improved the condition of the volunteers in whom ill effects had been observed.

Experiments are in progress to test the value of fortifying certain vegetable foods with vitamin B_{12}, but the interpretation of the results is rendered difficult by various factors, of which the most important is supply of the vitamin by the intestinal bacteria. If vitamin B_{12} can improve the biological value of vegetable protein for man as for other animals, it might help materially in overcoming the world shortage of animal protein. The possible effects on malnutrition in India, for example, might be far-reaching at comparatively little cost. We therefore feel the time opportune for an attempt to outline certain aspects of the nutritional importance of this vitamin, even although final solution of the problem may still be far distant.

Proteins in infant and child feeding

Under natural conditions, infants should ideally obtain all their protein from animal sources (*i.e.* breast milk) during the first few months of life. At the beginning of lactation, the protein in breast milk may provide over 15% of the total calories.[7] Data on many samples summarised in Fig. 1 show that during the first few weeks of lactation this proportion of protein falls gradually to about 8%, where it more or less remains throughout the remainder of lactation. This gradual fall is partly due to an increase in the fat content, which causes the more mature milk to have a higher calorie value, but mainly due to a steady decrease in the protein content which is now well recognised.[8] Supplementary feeding, which is usually introduced after the first few months, brings into the diet not only increasing amounts of the animal protein of cows' milk but also of plant protein, thus increasing the total protein intake on the calorie basis. Data on U.K. children show[9] that after weaning is completed, and the second year of life is reached, the average total protein intake may provide 12% of the total calories, of which about one-third is vegetable protein, and these levels remain fairly constant up to and beyond maturity.

The increase in total protein intake, from about 8% during early lactation to about 12% after weaning, may in part be a reflection of the lower biological value of the vegetable protein which has replaced some of the animal protein of breast milk. However, the full significance of this apparent large increase in total protein requirements after weaning still awaits interpretation. Since more vitamin B_{12} seems to be required when vegetable protein replaces animal protein, the need for this vitamin may be expected to become more acute after weaning.

Vitamin B_{12} and milk substitutes

Dietary deficiency of vitamin B_{12} in babies may thus be expected to be intensified if their weaning is to be done on to diets containing no animal protein. This has

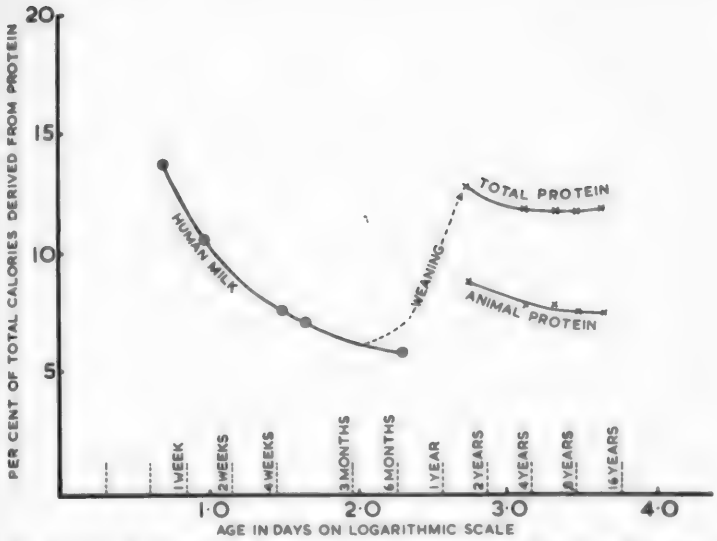

Fig. 1. Protein intakes in children at different ages as compared with those supplied to infants by breast milk.

in fact been seen amongst "vegan" babies when being weaned on to milk substitutes containing no animal protein. The rate of growth usually dropped sharply after weaning. In these cases, the protein intake on the calorie basis remained about the same, but was derived from vegetable sources such as soya and malted cereals. If vitamin B_{12} was added to the milk substitute, or if breast feeding was continued into the second year of life, more satisfactory results were obtained,[10] care having been taken to ensure an increased intake of other B vitamins by germination of the cereals[11] to raise the content of niacin and riboflavin well above the minima recommended by the British Medical Association.[12]

Soya as a source of protein

The use of soya in milk substitutes has been studied in many earlier investigations, which are summarised in a recent Medical Research Council monograph.[13] The high protein content of soya permits its dilution with other suitable vegetable material of lower protein content, amongst which unmalted or malted cereals such as wheat, barley or oats have been employed.

Removal of the bitter beany taste of soya may be effected by various methods, such as heating or treatment with germination enzymes. These methods are also used to destroy the trypsin inhibitor which lowers the biological value of the protein. Heating may denature the protein, and use of germination enzymes is preferable. Malting must be carried out carefully to ensure sufficient increase in the content of B vitamins, which may be inadequate in the unmalted materials, a point which is not mentioned in the M.R.C. monograph.

In clinical trials of vegetable milk substitutes carried out in Germany, no vitamin B_{12} supplementation was effected, although experiments on rats showed that the biological value of the protein might be improved by giving vitamin B_{12} intramuscularly.[13] This vitamin has, however, been used in more recent work on kwashiorkor in Central Africa.

Vitamin B_{12} and kwashiorkor

Kwashiorkor occurs typically in native children in the tropics weaned on to very poor diets markedly deficient in animal protein and vitamin B_{12}. It can be cured by administration of cows' milk, providing both animal protein and vitamin B_{12}. Recently, however, successful results have been obtained with diets free from animal protein, and containing a high level of vegetable protein (up to 18% on the calorie basis) derived from sweet bananas and soya and sometimes also from maize.[14] The difference between these curative diets, and those on which kwashiorkor had developed, was the fact that their protein content had been greatly increased by the inclusion of soya. However, soya is deficient in methionine, and it is of much interest that in some instances when vitamin B_{12} supplementation was employed better results were obtained. In an experiment[15] on Gambia school children living on a diet low in animal protein and receiving 13·4 μg. vitamin B_{12} per head each school day, no improvement in growth (weight and height) was observed, as compared with controls receiving no B_{12} supplementation, in a period of nearly a year. As the total protein content of this diet was much lower than those in which vitamin B_{12} had proved effective, the failure to obtain positive results in the Gambia experiment was perhaps to be expected.

A comprehensive investigation was recently set on foot to define the precise factors in skimmed milk which are responsible for curing kwashiorkor. Results given in a preliminary report[16] indicate that casein *per se* is probably the main curative factor, and functions in the absence of vitamin B_{12} which is normally found in milk. Equally satisfactory results have been obtained with a mixture of synthetic amino acids similar to that in casein, indicating that the curative factors must have been certain essential amino acids in the correct proportions for efficient absorption and utilisation. Some individual plant proteins, for example, are deficient in one or more of these amino acids, such as methionine, and the admixture of these proteins with cereal proteins which are richer in methionine may partially make good the deficiency. However, in the words of a recent review,[17] "the limiting deficiency in protein malnutrition is likely to be deficiency of certain amino acids, but that does not exclude the possibility that vitamins and allied accessory factors com-

monly found in association with animal protein may play an important part in determining the pattern of clinical nutrition and even the minimum or optimum requirement of individual amino acids." The possibility that vitamin B_{12} may be one of these factors will be considered in detail later.

Effect of vitamin B_{12} on growth of infants and children

Some experiments[18] to test this effect on premature and very young infants failed to demonstrate any advantage due to the vitamin. However, it was not established that the infants had any initial deficiency of vitamin B_{12}. This raises a difficulty in interpreting the results, which also applies to certain experiments on older children[19] in which there was also failure to demonstrate a positive effect of the vitamin. Positive effects on the growth and development has been obtained in other experiments,[20] especially on ill-nourished and under-developed children, with daily oral doses of 10-20 μg. Since the original Animal Protein Factor is thought to have contained antibiotics as well as vitamin B_{12}, it is of interest to note that administration of the vitamin together with penicillin has recently been reported[21] to have produced satisfactory results in convalescent children.

Vitamin B_{12} requirements in the diet of adults

The above experiments yielded some evidence in favour of vitamin B_{12} administration to children, but this has been criticised[22] on various grounds as not being very conclusive. However, there does seem to us justification for the administration of vitamin B_{12} to "vegan" children[4] whose diet is probably grossly deficient in this factor. In adult vegans, on the other hand, the need for B_{12} administration is certainly not universal. Among the group of 117 adult vegans studied in this country[3] only about 40 showed signs of deficiency, and some lived without any animal food whatever for over 10 years without serious illness. A study[23] of some 60 Dutch adult vegans who had been on this diet for a shorter time failed to discover definite signs of deficiency in any of them, though there was a slight increase in the average diameter of the erythrocytes, which suggested a tendency towards macrocytosis. A study[24] of a smaller group of 27 American short-term vegans also failed to demonstrate any definite deficiency. Moreover, there is the striking fact that, in certain parts of the Far East, millions of people have been living successfully for generations on diets very low in animal protein and hence presumably in vitamin B_{12}. On the other hand, many native people in Africa and India suffer from various diseases, including kwashiorkor, in which vitamin B_{12} deficiency may be implicated. On balance, there is perhaps some justification for the scepticism voiced in a recent review[25] in which is quoted the opinion expressed by the American Food and Nutrition Board in 1953 that there is not yet conclusive evidence that a healthy "normal" adult requires a dietary source of B_{12}. Nevertheless, it is admitted that further long-range experiments on vegetarians, for example, are urgently required, and it is suggested that the B_{12} requirements may be met by vitamin synthesised by micro-organisms in the intestinal tract and absorbed through the intestinal wall.

Vitamin B_{12} and micro-organisms

Vitamin B_{12} originates in certain micro-organisms which can synthesise it. Staple vegetable foods have not been found to contain significant amounts of the vitamin, apart from traces sometimes derived from contamination with soil bacteria, or rather larger amounts provided by bacteria and moulds in fermented products such as are commonly used in the Far East.[26] Some varieties of intestinal micro-organisms may provide considerable amounts of vitamin B_{12} to their host. In ruminants in which the digestive apparatus favours prolonged incubation of the intestinal contents, sufficient vitamin B_{12} is produced not only to satisfy the animals' total requirements, but also to ensure an adequate supply in the milk during lactation. The same appears to be true in herbivorous non-ruminants, assuming that they require B_{12}.

However, when man attempts to live for prolonged periods on diets containing very little vitamin B_{12}, he may encounter failures such as have been observed in vegans. It seems logical to associate man's need for dietary supplies of vitamin B_{12} with insufficient supplies of the vitamin from his intestinal flora, because of differences therein, so that the vitamin B_{12} producing micro-organisms no longer predominate, or alternatively the intestinal flora contains a larger proportion of micro-organisms which require the preformed vitamin for themselves and therefore prevent it from becoming available to the host.

Animal feeding experiments

Flodin has reviewed[27] the subject of amino acid imbalance in, and supplementation of, plant proteins. In the present review, we are concerned with any additional or amino-acid sparing effects of vitamin B_{12} on the nutritive values of plant proteins. This will depend, in part at least, on the identity of the limiting essential amino acid (or acids) whose deficiency is responsible for the lowered biological efficiency of the plant protein concerned, and on the question whether and how efficiently vitamin B_{12} can exert a sparing effect on that particular amino acid. In this connexion the suggestion should be borne in mind, as Flodin points out, that for most efficient utilisation the essential amino acids must reach the anabolic centres of the body cells *simultaneously* and in *proper proportions*. Amino acid imbalance apparently has a growth-retarding effect no matter what level of protein is fed.

Some of the earlier work on vitamin B_{12} led to suggestions that this vitamin might be identical with the "Animal Protein Factor" (A.P.F.).[28] However, more recent investigations have shown that, though vitamin B_{12} may possess A.P.F. activity and

indeed be the major component of that factor, there are other so-called animal protein factors which, though not yet identified, do not appear to be vitamin B_{12}.[29]

The effect of vitamin B_{12} on the biological value of vegetable proteins in animal feeding tests varies with different vegetable proteins and also with the animal species involved. Thus vitamin B_{12} was shown[30] to have little or no effect on the biological efficiency of rice diets fed to weanling rats, except in the case of a rice diet supplemented by lysine and threonine as well as by aureomycin. This diet was further improved by supplementation with vitamin B_{12}.

On the other hand, in the case of soya bean protein vitamin B_{12} was found to produce significant effects in rats and chicks. In the first place, supplementation with vitamin B_{12} was shown to enhance the biological value of raw, unheated soya bean protein,[31] the vitamin seemingly being able to overcome the adverse effects of the proteolytic inhibitor present in raw soya bean. In the second place, vitamin B_{12} was found[32] to have a definite function in increasing the utilisation of soya protein irrespective of the extent of heat treatment; thus it also increased the biological value of heat treated soya protein so that its action is concerned not merely with the trypsin inhibitor.

However, it has also been shown[33] that certain maize-soya meal rations for chicks were limited in methionine and that this limiting amino acid had to be added to the ration in order to obtain the full benefit of added vitamin B_{12}. This is in agreement with the findings of others[34] that the addition of either methionine or B_{12} to a diet deficient in both these factors (*e.g.* vegetable diets based on soya protein) will improve growth, but that much better growth response is obtained when both deficiencies are corrected.

Improvement of wheat protein by vitamin B_{12} supplementation has also been demonstrated by several workers, although here again, the main amino acid deficiencies have to be made good by supplementation before optimum results can be obtained in rats. The addition of vitamin B_{12} to a bread diet fortified with lysine was shown[35] to give optimum growth response and protein efficiency. In another series of rat feeding tests the greatest effect of B_{12} on the protein efficiency of processed (shredded) wheat was obtained[36] in the presence of added lysine and threonine. If soft whole wheat was used in these tests, further supplementation with valine was needed for optimum growth rates and protein efficiency values.

Certain maize-cottonseed meal rations for chicks were likewise shown[33] to be limited in lysine which had to be added to the diet before the full benefit of vitamin B_{12} supplementation could be obtained.

Improvement of the nutritive value of plant proteins deficient in certain essential amino acids can also be obtained by blending with other plant proteins in which there is a relative abundance of the "limiting" amino acids. Thus it was found[37] that the proteins of milled rice were effective in supplementing and balancing the deficient proteins of maize and of wheat; and a mixture of malt extract, wheat flour and soya flour has been claimed[38] to have a growth promoting value for young rats approximately equal to that of milk proteins.

Indeed, the standard vegetable protein rations used in animal feeding tests and consisting of mixtures of soya and maize, or of maize and cottonseed, are in themselves attempts at such balancing.

Several dehydrated vegetables, particularly lettuce, mustard greens, green beans and watercress, have been found[39] to be excellent sources of amino acid supplements to the proteins in wheat flour and white corn meal. The importance of balancing the plant proteins derived from cereals and those derived from pulses has also become evident in our work on vegetarian diets.[5]

However, the improvements in biological values obtained experimentally with mixed plant protein diets, though often substantial, cannot be relied upon to render them equivalent to that of first class animal protein, particularly in human nutrition.

Before leaving the subject of nutritive values of individual cereal grains, attention might be drawn to the superior nutritive value of rye which is relatively neglected both in this country and in the United States. Recent investigations by Sure[40] have shown quite clearly that whole rye flour is markedly superior to whole wheat flour as a source of protein, the protein efficiency of the former being about 40 to 50% higher than that of wheat flour when fed at 8 to 9% protein levels, and 120% higher when fed at 5% protein levels. It is worth considering whether an increase in rye cultivation at the expense of nutritionally less valuable plant proteins could not materially help in improving the world protein supply.

Likewise, a large expansion of buckwheat cultivation has been advocated because of the high biological values reported for buckwheat proteins,[41] which would seem to make it the best known source of plant protein of high biological value.

Possible role of vitamin B_{12} in human nutrition

The above experimental findings illustrate some of the problems in the replacement of animal protein by vegetable protein in human nutrition. The key position occupied by certain essential amino acids, particularly lysine and methionine, has been emphasised. Methionine is of interest as the only essential amino acid which contains sulphur and presumably plays an important part in sulphur metabolism.

We have been particularly interested in the possible relationship between vitamin B_{12} and the sulphur-containing amino acids and other sulphur-containing metabolites, for the following reasons:

1. The possibility, which has already been discussed, of reducing the methionine deficiency of soya by supplementation with B_{12}.

This is of particular interest in view of the wide use of soya as a source of protein, especially in areas where animal protein intake is low.

2. Much recent evidence which has accumulated to show that vitamin B_{12} is concerned in the methylation of homocysteine to methionine, and also in the production of serine, which is a precursor of cysteine.

3. Evidence that vitamin B_{12} is involved in the reduction of disulphide linkages and the maintenance of sulphydryl groups.

4. The correlation observed recently between vitamin B_{12} status and thiocyanate excretion in humans.[3, 42]

A working hypothesis involving vitamin B_{12} in a sulphur transfer cycle (Fig. 2) has recently been formulated and discussed by us in detail elsewhere.[43] A brief summary of this hypothesis may be helpful before we draw our conclusions.

The urinary excretion of thiocyanate was shown to be increased in vitamin B_{12} deficiency, and reduced by administration of large doses of the vitamin in volunteers under controlled conditions. Apart from traces of ingested dietary thiocyanate, which are very much smaller than the amounts excreted in the urine, all of this urinary thiocyanate presumably arises through detoxication of cyanide in the body. In the liver, the cyanide is detoxicated to thiocyanate by the enzyme rhodanese and a sulphur donor which might be cystine. The thiocyanate is normally excreted in the urine. However, in the presence of adequate supplies of vitamin B_{12} in the liver, some of the thiocyanate is assumed to be taken up by the hydroxo-form of the vitamin to form thiocyanatocobalamin. This is thought to revert to cyanocobalamin, the sulphur being transferred to an active intermediate "X" to form "SX," which could be a precursor of biologically important sulphur-containing compounds. The cycle is completed by regeneration of hydroxocobalamin, the cyanide so liberated re-entering the detoxication

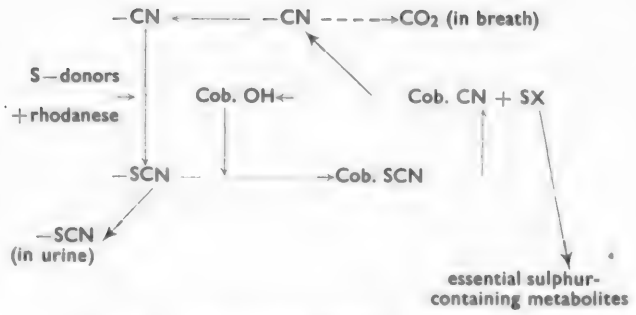

Fig. 2. Hypothetical sulphur transfer cycle.
Cob., CN = cyanocobalamin; Cob. OH = hydroxo- or aquocobalamin; Cob. SCN = thiocyanatocobalamin

system, as shown schematically in Fig. 2.

In this way, hydroxocobalamin, together with traces of cyanide, would function as carriers in the transfer of sulphur to essential metabolites which may include sulphur-containing amino acids. The cycle could account for the observed changes in thiocyanate excretion in human vitamin B_{12} deficiency, and might explain, in part at least, the animal protein factor activity or methionine-sparing action of vitamin B_{12}.

In the sulphur transfer cycle, cystine has been postulated by us as a possible sulphur donor which in the presence of vitamin B_{12} could thus exhibit a methionine-sparing action. Of particular interest are, therefore, the recent and most striking results of Rose and his co-workers,[44] which show that in normal young men L-cystine appears to be capable of replacing the bulk of their minimal methionine requirements. From the experimental data it is clear that their test diets included a vitamin mixture containing an unspecified, but probably quite appreciable, amount of vitamin B_{12} derived from liver concentrate. In any event, even in the absence of added B_{12}, Rose's normal healthy adult subjects may be expected to have adequate vitamin B_{12} reserves for such short-term investigations. The question of testing whether this methionine-sparing effect of cystine is dependent upon the presence of vitamin B_{12} is clearly of interest.

The formulation of our working hypothesis suggests various other experiments, some of which have been proposed elsewhere.[43] These are beyond the scope of the present review. The hypothesis deals only with certain aspects of vitamin B_{12} functions. There are, of course, other important functions for which evidence is gradually accumulating, *e.g.* its role in nucleic acid synthesis, particularly in the thymine⟶thymidine stage, also the functions mentioned above (synthesis of labile methyl groups, reduction of S-S linkages).

Conclusions

Protein deficiencies play a major part in the world food problem. Where these deficiencies are predominantly quantitative, due to dietary intakes of total protein below the absolute minimum requirement, supplementation with vitamin B_{12} or related factors will, of course, not solve the problem though it may alleviate it.

However, the gradual fall in protein content of human breast milk during lactation suggests that the absolute minimum requirement of the first class protein which it contains is quite low, perhaps no more than 8% on the calorie basis. It is worth recalling that protein deficiencies have been encountered with diets containing more than this minimum of total protein. However, the content of vegetable protein in this total protein was very high.

If sufficient dairy protein could be made available to meet world requirements, the problem would be readily solved.[45] But even assuming that this desirable end could eventually be achieved (which is far from certain) we are in the meantime compelled to

make widespread and increasing use of vegetable proteins, in which the amino acid pattern may differ significantly from that in milk proteins. This leads to a consideration of the following possible methods of tackling the problem:

(1) Fortification of proteins in vegetable foods with individual essential amino acids in which they are deficient. However, technical and economic problems in the large scale production of the amino acids concerned would seem to preclude their use on a world scale, in spite of the intensive and ambitious efforts which are being made in the manufacture of some of these, especially in the United States.

(2) Use of suitable mixtures of plant proteins in which the so-called "supplementary" action of proteins will operate, a deficiency of a given essential amino acid in one protein being more or less balanced by a relative excess of that amino acid in another protein. Such a procedure can reduce the degree of deficiency but cannot be relied upon to overcome it completely.

(3) Fortification with vitamin B_{12}. The experimental results so far obtained give some grounds for hope that this method might be used to diminish deficiencies of sulphur-containing amino acids, such as methionine in soya. If such a procedure could be proved to be effective in man, it would probably be more economical and practicable than fortification with methionine.

An example of the application of the first method, which has been mentioned earlier, is the fortification of wheat with lysine,[35, 36] although fortification with vitamin B_{12} as well also seems to be advantageous. The possibilities of supplementation with specific essential amino acids of plant, especially cereal, proteins have been fully discussed by others.[27, 46] However, in the absence of adequate information concerning production plans, some scepticism seems justified about the practicability of this approach to the world problem of protein shortage or protein malnutrition.

Examples of the application of the second method, blending of vegetable proteins to utilise their supplementary action, have also been mentioned earlier.[13, 37, 38, 39] To them might be added the widespread use during recent years of relief supplementary foods, such as "M.P.F.," an American preparation based on defatted soya and vegetable extracts and providing the daily requirements of protein, minerals and all main vitamins except B_{12}.

The third method, fortification of vegetable foods with vitamin B_{12} to make good their deficiencies of methionine, requires much more careful study than has so far been given to it. Indeed, much more evidence needs to be obtained about the value of all these methods, individually and in combination, in carefully planned large-scale trials. In such investigations, it will obviously be necessary to consider also the possible effect of the intestinal flora, and no rapid or easy success must be expected. Nevertheless, the magnitude and importance of the problem surely justifies the effort involved.

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Fine Fare at the Food Fair

A big demand for quality and novel goods was evident during the Food Fair held in London last month. Foreign and traditional English foods were equally popular, and although strictly speaking it was a "British" Fair, the presence of several overseas stands and of many foreign foods on British stands gave it an international character. "Food Manufacture" reports some of the highlights of the exhibition.

THE FIRST Food Fair to be held since the end of rationing showed that British tastes have become more sophisticated during the past two years. Sixteen different countries displayed and offered samples of a wide variety of foods including edible snails, hamburgers, vodka, Continental sausages, pickled ox tongue, caviare and fish from every part of the world. One company displayed 112 different varieties of cheese. Many foreign food products are now being manufactured in this country and were displayed to the public. They include gristicks, scampi, salamis and doughnuts. Other firms have introduced unusual lines, such as Kraft's cheese and onion spread, which proved highly popular.

However, public taste was not merely for novelty. Freedom from restrictions has encouraged a demand for high quality traditional products. The Gas Council's stand, on which 80 cooks demonstrated regional and county dishes, was crowded throughout the Fair and the English Country Cheese Council held a series of well attended demonstrations and film shows on the art of cheese-making. An impressive display of British farm produce was held on the National Farmers' Union stand, where visitors were particularly interested in pre-packed fruits and vegetables. Quality hams, sausages and other meat products were bought in large quantities.

Many pre-war specialities have returned, such as the small nuts and raisins pack by Smith's Potato Crisps, Ltd., and Spring and Co.'s Lincolnshire lemon cheese. A popular "traditional" dish in a new pack was Mudd's haddock and chips, ready-cooked in an aluminium foil dish and wrapped in a cardboard outer simulating newspaper. Whether new or traditional food products were exhibited, it was noticeable that the public was particularly interested in learning new ways of serving and preparing food. Most exhibitors gave away recipes or demonstrated the use of their products.

The Food Manufacturers' Federation, who promoted the Fair, under the sponsorship of the *Daily Express*, shared a stand with the British Food Manufacturing Industries Research Association and the National College of Food Technology. The functions of these organisations were explained to members of the public by their officials. The Federation ran a short film, *Kitchen Crisis*, showing the preparation of an emergency meal from processed foods.

Equipment and materials

The Fair was, of course, primarily for the general public, but some suppliers of products and plant for the food industry took the opportunity to help popularise still further the foods for, which their products are used. Notable amongst these firms were Foodtech, Ltd., and the Oppenheimer Casings Co., Ltd. Many visitors were attracted to Foodtech's stand where a sausage-making demonstration was held featuring the company's *Saxonia* rotor chopper, the *Wommer* twist-linker, a vacuum packing machine, a sausage drying oven and other plant. The sausages enjoyed a ready sale among the public, as did samples of Continental sausages on the stand. Oppenheimer used the Fair to launch a hog casing campaign under the title *King-size*, and offered visitors samples of freshly grilled pork sausages and frankfurters in *Oceco* hog casings. Cooked slicing varieties in *Hypak* self-coloured casings were also displayed.

Flavouring essences and colours for foods were exhibited by Rayner and Co., Ltd., besides Indian and English chutneys, cocktail cherries and salad cream.

Cookery demonstrations were held by both the British Electri-

cal Development Association and the Gas Council. The B.E.D.A. featured "automatic cookery," using 9 thermostatically controlled electric cookers to produce simultaneously extensive menus. Special emphasis was laid on the use of oven glassware and foil containers.

Glass containers for preserves, jellies, sauces, pickles extracts, meat and fish pastes, invalid foods, mineral waters, fruit squashes, coffee extracts and many other food products were displayed by Key Glassworks, Ltd. Many of them were made in their new factory at Harlow New Town.

Equipment for the food industry was displayed by the Heston Equipment Co., Ltd., who exhibited a wide variety of trays, containers, fish trunks and freezing trays used for the hygienic manufacture of food. Representatives on the stand discussed requirements of food manufacturers both visiting and exhibiting in the Fair.

Other highlights of the Fair included the following:

The full range of products made by Oxo, Ltd., and their associated company, Tanganyika Packers, Ltd., was shown. Samples of soup and corned beef were available to visitors.

Acacia honey from Hungary, orange blossom honey from Israel and Spain and wild thyme and wild rose honey from Greece were shown by the Bear Honey Co., Ltd., together with their English and Scottish heather products and their imported blended honeys, supplied either bottled or in bulk.

Dehydrated vegetables in pocket-sized packets were displayed by F.M.S. (Farm Products), Ltd. They claimed that each packet of peas, macedoine, onion, carrot or beetroot would provide four helpings.

Canned whole duck, peeled Italian plum tomatoes, Formosan pineapples, and Peruvian tuna fish were among the products shown by S. Daniels and Co., Ltd.

Bread sticks—original Italian grissino—are now made in Britain.

Mr. Heathcoat Amory, Minister of Agriculture, Fisheries and Food, talking to Mr. G. R. B. Patterson, Senior Trade Commissioner in London for the Australian Government, at the Australian stand.

The flavour-enhancing properties of pure monosodium glutamate under the name *Ac'cent* were demonstrated by Getz Bros. and Co., by offering the public samples of soup treated with m.s.g.

Crosse and Blackwells celebrated their 250th anniversary this year, and Mr. Victor Crosse, a direct descendant of one of the founders, was on their stand to welcome visitors.

A new orange squash was featured by L. Rose and Co., Ltd., in addition to their famous lime juice cordials.

Fish and chips in aluminium foil dish and striking outer carton—by Mudd's of Grimsby.

Giant crystal prawns, scampi, peeled shrimps and potted shrimps in butter were among the sea foods displayed by Young's Potted Shrimps, Ltd. Leaflets and booklets giving ideas for serving these products were distributed.

Concentrated and quick-frozen Spanish orange juice was exhibited by Frigidfruits, Ltd. The juice is canned and sells at 1s. 6d. per can (sufficient to make ¾ pint of pure juice).

Canned Valencia oranges, peeled and in segments, were among the free samples offered by Smedleys from their 250 lines. The most recent of these are meat and pastry products including canned steak and kidney pie.

A truffled galantine of chicken, ham and tongue containing pistachios and stuffed olives, was displayed by C. and T. Harris (Calne), Ltd., together with their well-known meat products.

Seven soups made from mixes at present being carried on a British-American expedition to the Himalayas could be sampled by visitors to Batchelors' stand.

Gristicks—the original Italian *grissino* bread sticks—are now manufactured, packed and distributed by Gristicks, Ltd., and were displayed by them in three different varieties—plain, salted and cheese-flavoured.

Left: **The Naafi stand—complete with a "Bruin" automatic tea maker.** *Right:* **Crowsons had a remarkably comprehensive display of cheeses.**

Tarragon mayonnaise and fruit sauce were shown by John Burgess, Ltd., in addition to their anchovy paste.

Grapefruit juice and chicken-and-ham spread were two new products displayed by Heinz at—appropriately enough—Stand 57 (though Heinz actually have 93 varieties at present). Samples of their products were given away and miniature packages sold.

National stands

The U.S., Poland and Australia had the three biggest stands at the Fair. The U.S. stand presented a broad picture of American food production, packaging and consumption. Their hamburger bar was a popular feature and the preparation of other American foods, such as pumpkin pie, was demonstrated.

Commonwealth countries were well represented. The Australian stand included a wine bar, a pineapple juice bar, a "delicatessen shop" selling ham, tongue, brisket, corned beef, etc., and a large lounge for trade visitors. Canned fruit and many other goods were sold. Coconut shies were used on the New Zealand stand to display goods. New Zealand's 22-year-old position as Britain's chief supplier of meat, butter and cheese was emphasised by displays of these goods and of canned vegetables—she is also said to be our chief supplier of canned peas.

Guavas, papaws, peaches, pineapples and apricots were exhibited by South Africa, together with apples, pears, plums and citrus fruits. Canned foods shown included Cape Rock lobster, dairy products, preserves, wines and spirits. Malaya was represented by the Central Board of Pineapple Packers, who invited the public to sample juice, spiral cuts, cubes and slices.

The two national export agencies, "Animex" and "Rolimex," exhibited a large range of goods on Poland's stand. Fresh, smoked and canned meats, fish and frozen poultry, fruit and vegetable preserves, potato products, mushrooms, forest berries, onions, dried chicory roots and vodka were displayed. The Hungarian stand was attractively designed with three dining rooms furnished in the peasant style. Visitors sampled "Bull's Blood" (a strong, red wine), Tokay, salamis, dried smoked sausage, pickled ox tongue, goose liver and *Pannonia*, a blue cheese.

The United States had one of the biggest national stands.

Rumania's stand was chiefly interesting for a large display of herbs, seeds and cereals, including white mistletoe, nettle leaves, blue mallow flowers and sliced chicory roots. Frozen sturgeon, mushrooms in brine, live crayfish and frogs, wine and caviare were also shown. Some of the most original confectionery was displayed by Czechoslovakia, who showed *Panorama eggs* made in sugar with a transparent window through which romantic scenes could be viewed inside the egg. Fruit liqueurs in fruit-shaped decanters were displayed, together with Pilsener, slivovice and vodka. Other foods included Prague hams, sausages, canned poultry and game.

Agricultural produce was naturally displayed by Eire as 90% of her farm exports are sent to this country. A very wide range of agricultural products was also shown by Italy, in particular canned tomatoes and tomato purée. The development of the Italian fruit juice industry was stressed by a display of lemon, orange, tomato, pear and apricot juices. Canned and frozen fish were the main exhibits of the Norwegian stand, and margarine, cheese and ham were also shown. Spain was represented on two stands; one displaying olive oil and the other showing a representative selection of Spanish products including wines, fresh and canned fruits and vegetables, confectionery, fruit juices and rice.

The Perishability of Food in Consumer Packs—2

By C. Olin Ball

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Non-enzymic chemical spoilage of foods is discussed by Dr. Ball in the concluding part of his article, the first part of which appeared last month. He also considers the best means of preventing the spoilage of packaged foods, particularly by low temperature storage.

CHEMICAL SPOILAGE (NON-ENZYMIC)

FOODS with moisture contents of 20% and higher may react chemically with the container.

Sterilised foods

In foods that are sterilised, chemical reaction between a food and the metals of its container is almost universal. The rate of reaction is roughly proportional to the hydrogen ion concentration of the food and, with low acid foods, the reaction is slight.

The effect of this reaction upon the organoleptic and nutritional quality of the food is slight and usually becomes noticeable only after a long period of storage. One of the most conspicuous of the effects upon food quality is loss of colour in fruits, notably cherries and berries, resulting from the destruction of red, blue and purple pigments, known as anthocyans.

Exposed tinplate surfaces on the interior of containers holding foods from which sulphydryls are liberated during heat processing, such as sea foods, meat, cream, evaporated milk, and corn, may become darkened by film deposits of tin and/or iron sulphides. Under certain circumstances, particles of iron sulphide may become dispersed in the product. These black particles spoil the appearance of the product.

Loss of food from internal corrosion of the container is usually caused by deterioration of the container rather than by direct degradation of the food, namely, through perforation of the container or through hydrogen swelling. If the visible manifestation is merely swelling of the container, the food is not spoiled but is discarded merely because a swelled container is considered to be a criterion of spoilage. When perforation occurs, the food either suffers microbial action or quickly deteriorates in palatability, and usually also in appearance, because of enzymic action, oxidation, and the presence of dissolved iron. Corrosion of a container from the outside may also perforate the container.

Aside from the chemical nature of the food, factors which influence the rate of corrosion of a container are (1) the chemical and physical nature of the material of which the container is composed and (2) the manner in which the container was fabricated. These factors involve the composition of the steel, the amount and the distribution of tin in the coatings, the nature of organic coatings on both the inside and outside surfaces of the container, and the nature of the material used in fabricating seams of the container. The technology and engineering required to control reactions between a food and its container and between outside moisture and the container are extremely involved. An elucidation of them is beyond the sphere of this article. It should be noted, however, that the principles underlying such control are coming to be well understood and, consequently, the deterioration of food from this cause amounts to only a minute fraction of what it was 20 years ago.

Deterioration of colour occurs in most heat sterilised foods due to unexplained reactions, which are believed not to be associated with corrosion of the container. Many light coloured foods suffer from slow browning. In some fruits prone to browning—*e.g.*, citrus, pineapple, and Royal Anne cherries—the effect is commonly considered to be obviated by placing the product in direct contact with a non-covered tinplate surface during storage. Since oxidation can unquestionably contribute to browning effect, the benefit derived from having an exposed tinplate surface inside the container is thought to be due to the rapid removal of free oxygen from within the container through combination of the oxygen with the metal. This may be a sound postulation but it is certainly not universally applicable. In some low acid products, browning occurs in plain tinplate cans. Evaporated milk is a prominent example. The presence of free oxygen in canned foods is probably not essential to the development of browning in these foods.

Another type of colour degradation in canned foods is a fading of greenness. This is usually thought of simply as loss of chlorophyll. Recent work seems to give weight to the idea that this type of colour change may be closely associated with browning. It has been reported that browning seems to be due to the effect of the *p*H of the solution on the carbohydrate alone and that the essential condition for the development of browning is a combination of acidity and reducing sugar. Acidity also promotes the loss of chlorophyll, which takes place in canned peas, asparagus, green beans, and greengage plums.

Seepage of air through the sealing gaskets of containers has presented a discoloration problem for many years. The results were very serious in cans in the days when untreated paper gaskets were used. Until recently, in glass containers, browning or greying of the

portions of food near the caps has sometimes been very annoying. This was caused by diffusion of air through the gasket. Browning from this cause is much more serious than that discussed in the preceding paragraphs because of the difference in intensity and of the rate of development. The solution of the problem was found to lie in the replacement of the GR-S type rubbers in the gaskets with synthetic rubbers of lower gas permeability.

Non-enzymic changes in sterilised foods, apparently not related directly to the container, may also affect the texture and flavour of the products. Jellification of normally liquid products is one of the most annoying of these difficulties. This can occur in evaporated milk which has been sterilised by a short high temperature process. A large increase in consistency heaviness may also occur in cream style corn, which is influenced to a considerable extent by the characteristics of starch used in formulating the product.

Products of heavy consistency, containing thickening agents, may also undergo syneresis during storage. The rate at which the separation of liquid occurs and the point to which it progresses are influenced to some extent by the characteristics of the thickening agent.

Flavour deterioration in canned foods, as in other classes of food, during storage, is universal. Examples which stand out are evaporated milk, in which the so-called "cooked flavour" seems to intensify as browning progresses, and citrus juices, in which bitterness develops—said to be due to the formation of terpenes. It seems that flavour changes can result also from attributes of the food which are not normally inherent in the product. A flavour which had its origin in substances from soil on which a herbicide, *Karmex W*, was used, has been found in canned asparagus and it intensifies during storage.

Elements of nutritive quality in sterilised foods also deteriorate during storage. For example, the vitamin content of many canned foods decreases at a rate that depends upon the storage temperature. On quality deterioration of sterilised foods in storage generally, the characteristics of the container exert some, but not a really great, influence. The container is all important, however, in regard to one aspect of nutritive quality. The food must absorb no toxic substance from the container; therefore, the container materials must contain no toxic substance. However well a toxic component of a container material may seem to be masked, the substance will, in time, find its way into the food. Foods vary, of course, in their susceptibility to such absorption.

Lastly, in the category of chemical decomposition in preserved foods, may be mentioned jams and jellies, which sometimes undergo non-enzymic browning.

Frozen foods

Frozen foods undergo changes in appearance from non-enzymic causes similar to the changes which have been described for canned foods, with the exception of those which are caused by reaction with the container components. Some types of appearance and texture degradation in frozen fruits, such as cloud loss and gelation in citrus concentrate, have been found to be due to the action of enzymes. Most types of quality deterioration in fruits, including those of appearance, texture, flavour, and nutritional quality, have not been shown to be due solely to enzyme action. For the present, therefore, it seems reasonable to assume that quality deterioration, such as browning, loss of greenness, loss of redness, and development of rancidity, staleness, or hay-like flavour can occur independently of enzymes—howbeit, the reactions may be much slower in the absence of enzymes than when they are produced through the action of enzymes. Thus, for frozen foods in which enzymes have not been inactivated, non-enzymic chemical deterioration probably is of little moment because enzymic degradation reaches an advanced stage before any substantial contribution is made by non-enzymic reactions. When enzymes are inactivated, however, a large percentage of the same types of degradation as are produced by enzymes develop in frozen foods slowly. Ascorbic acid is commonly used as an antioxidant in fruits.

In frozen fish exposed to oxygen, rancidity and toughness develop more slowly than some other forms of deterioration; therefore, these forms of deterioration may be non-enzymic. They develop appreciably within six months in storage at 5°F. Vacuum packing of the fish retards both actions greatly. Glazing also checks oxidation but, unless storage is at −40°F. or lower, glazing must be repeated every 60 days or oftener to be effective. Ascorbic acid in the water used for glazing is helpful.

Dried and dehydrated foods

The same principle applies to dried fruits and dehydrated foods. In the former and in some dehydrated foods, enzymic action dominates the quality deterioration in ways that have already been discussed.

Such dehydrated foods as cabbage, onion, sweet potato, white potato, carrot, beet, whole milk, eggs and fruit juice powder, when enzymes have been inactivated, suffer development of oxidative off-flavour, fading of natural pigments, caking, loss of ascorbic acid and carotenoids, and development of non-enzymic browning with the off-flavours that accompany browning.

The attainment of very low moisture content (below 1%) prevents caking and retards browning and loss of some flavours and of ascorbic acid. Packing in vacuum or in an oxygen-free atmosphere retards the fading of natural pigments and the development of oxidative off-flavour. In-package desiccation (enclosing with the dehydrated product a small quantity of desiccant in a moisture-permeable container) seems to be the only practicable method of achieving a product having a moisture content below 1%. The overall package must be moisture proof, of course. This procedure, although proven in principle, has as yet scarcely emerged from the laboratory.

A phenomenon which is physical in nature, although probably closely related to chemical conditions, is sugaring, which occurs in dried fruits. This, too, is promoted by high moisture content. Dried fruits having a moisture content of about 20% are likely to sugar if stored in relative humidity of 60% or higher unless they are protected by a package that is highly moisture-resistant.

In high-fat confections, at temperatures above the melting point of the fat, migration of fat may occur, affecting the texture of the product and, where oxygen has access to the migrated fat, accelerating oxidative rancidity.

Prepackaged meats

Fresh and cured meats in film packages present unique problems —most of them rather closely associated with the characteristics of the package. Quality degradation begins in the realm of colour, the changes in which involve the complex chemistry of the haem pigments. Fresh red meats present an anomalous situation. Either unlimited access to free oxygen or no free oxygen at all preserves a good colour. In the former condition, the pigments assume the form of oxymyoglobin, which has a bright red colour. In the latter condition, the pigments assume the form of reduced myoglobin, which has the purplish-red colour of freshly cut beef and which, when exposed to oxygen, is converted into oxymyoglobin. These facts, on their surface, may seem to indicate a simple colour preservation problem. Actually it is just the opposite, because of many influences. For instance, when unlimited access to free oxygen is established, the meat loses moisture and, as a result, darkens, takes on a dull appearance, and loses weight.

In the case of cured meats, cooked or non-cooked, the nitrosomyglobin, which is responsible for the desirable colour, is decomposed by oxygen and/or light. Thus, the packaging problem with cured meats is different from that with fresh meats, but almost as complex. In either case, there is room for vast improvement over present practice.

It is difficult to say whether in prepackaged meats fat deterioration through oxidative or hydrolytic reactions or protein and carbohydrate deterioration through microbial action is second in importance after colour degradation. Chronologically, neither type of spoilage consistently precedes the other. Therefore, sometimes one, sometimes the other, deserves the more attention. In prepackaged ready-to-serve (cooked) cured meats, in which the enzymes have been inactivated, microbial spoilage usually precedes rancidity. In uncooked cured meat, this is probably not the case.

Prepackagers of meat must constantly be on guard against the use of packaging materials that could produce off-odours and off-flavours in the meat or transmit toxic substances to the product. A possible source of off-odour or off-flavour degradation is solvents contained in adhesives used in laminating. Complete expulsion of these solvents in the fabricating process is essential if this sort of trouble is to be avoided. This problem is less serious with uncooked meats than with ready-to-eat cuts because, in the former, the offensive volatiles are expelled in the cooking and are frequently unnoticed.

MISCELLANEOUS SPOILAGE

Desiccation, carried to an extreme, is desirable in dehydrated foods. In frozen foods, desiccation causes a serious form of spoilage, known as "freezer burn." The remedy is a moisture-proof package. Desiccation is a problem also with unfrozen prepackaged meats, dried fruits and prepackaged fresh fruits and vegetables. In prepackaged produce of all kinds, desiccation is involved with the important problem of controlling the composition of the atmosphere within the package, in contact with the produce.

Another phenomenon involving the liquid of frozen meat is seepage which occurs during and immediately after thawing. The amount of liquid given up appears to bear a direct relationship to the length of the storage period of the frozen meat. There is some doubt as to the relationship between the storage temperature or the type of package and the amount of seepage. The liquid carries away with it some flavour and nutritive elements of the meat. When stored for a long time frozen fish becomes tough. This is thought to be due to dehydration of the proteins during storage. The amount of such denaturation varies directly with the storage temperature as well as with the length of storage.

Separation of components which differ substantially from one another in specific gravity is likely to occur in liquid products in which the consistency is insufficient to prevent such separation. Perhaps the commonest example of this action is cream separation in sterilised evaporated milk and in pasteurised milk. Homogenisation of the product, high consistency, and low storage temperature all retard this action.

A limited number of types of products in certain commonly used types of packages are vulnerable to still another type of destruction, namely, insect infestation. The vulnerable types are dried fruits, dehydrated foods, cereal grains, and fresh fruits and vegetables. In the cases of grains and fresh produce, insect infestation from outside the package is of minor importance; most insect injury in these foods is probably due to insects that were present before packaging.

WHAT CAN BE DONE TO RETARD SPOILAGE

The functional characteristics required in packages to properly protect sterilised foods are well understood and have largely been incorporated into the packages now in use. In the case of frozen foods, while the required functional characteristics of the packages are pretty well understood, they have not been adopted wholeheartedly because it is doubtful if the system of distribution warrants a plan of operation based upon the maximum possible shelf life for these

products. Also, there has been a reluctance to use rigid hermetic containers for frozen foods because of a feeling that their use would be accompanied by health and safety hazards, based on the possibility that the user would store the products at room temperature. The fear of these hazards seems to be disappearing rapidly as experience increases in marketing certain frozen foods in hermetic metal containers. The functional requirements of packages for dehydrated foods are probably less well known than are those of packages for sterilised and frozen foods. Thus dehydrated food packages now in use probably fall farther short of meeting the requirements of the best type of package than do those of sterilised and frozen foods. The factor of "what the traffic will bear" seems to play a larger part in determining the feasibility of improvements in packages for dehydrated food than it does for packages for the other classes of food.

So little is known about how to package fresh foods so as to get the maximum possible benefit in the control of perishability of the product that one is justified in saying that, in this field, the surface has hardly been scratched.

Aside from the benefits that can be gained by intelligent packaging, there is one factor in the handling of foods which, were it universally applicable, could be called the universal preventive of perishability in foods. This is low temperature storage. Some level of temperature is adequate to prevent almost any kind of change which reduces the organoleptic quality and wholesomeness of food. However, if a temperature which is adequate to do this were always employed, the product would still often be unsound for use as food because the low temperature, in preventing one kind of deterioration, would produce another. The most common undesirable effect of low temperature is destruction of texture, although there are also other effects, such as reduction in nutritive quality which can come from low temperature storage. In many cases, the only reason for not using a low enough temperature to prevent deterioration of the food is an economic one. It simply costs too much.

Notwithstanding these limitations, there is almost an unlimited possibility of using low temperature to preserve in a food the quality with which it goes into the package. These temperatures, as applied to all foods except those in the category of frozen foods, are above the freezing point. Non-enzymic, non-microbial deterioration, such as occurs in sterilised and dehydrated foods, is almost as effectively retarded at 35°F. as at −10°F., in so far as commercial significance is concerned. Deterioration due to enzyme action, in foods of low moisture content, also is greatly retarded at 35°F. Thus, both dehydrated foods, if given reasonably good package protection, and sterilised foods, could be held at 35°F. with no detectable change in quality for the duration of a reasonable commercial life.

This article is the substance of a paper read before the 17th annual forum of the Packaging Institute, New York.

The Art of Top Fermentation Brewing

THIS book* is an excellent introduction to the "art" of top fermentation brewing for the pupil brewer and contains much useful and practical information. The only criticism is that there is a tendency here and there for over-simplification, *e.g.*, chemistry of carbohydrates and proteins, but this is perhaps unavoidable in an introductory book like this.

Chapter I deals with brewing as a profession and gives much good advice. From Chapter II onwards we pass to brewing proper. The brewery and brewing plant are described in Chapter II, which is a model of accuracy and compactness. Chapter III deals with the scientific principles of brewing, and, as has been stated above, there is a tendency for over-simplification. On the other hand, the authors have covered themselves by recommending the pupil brewer who wishes to go further into the subject to read such specialised works as Hopkins and Krause and Preece.

Chapter IV, on brewing materials, is very good, and so is the description of the brewing process (Chapter V).

The chapters on biological control and brewing troubles in general could not be bettered. In the circumstances, therefore, it is most unfortunate, to say the least, that this admirable and up-to-date work is marred by a shocking illustration of a microscope (p. 287). Even the authors appear to have had qualms about it, because there is a rather apologetic slip attached to explain its appearance. This is indeed an unlucky instrument, even to its number (Fig. 13). It is to be hoped that when the authors revise the book Fig. 13 will be consigned to its proper place, a museum.

This book caters for the top fermentation brewer and succeeds admirably. Great Britain is the last stronghold of top fermentation brewing, but over the rest of the world bottom fermentation brewing is the order of the day, and it can only be a question of time before bottom fermentation brewing takes hold in this country. It would improve another edition if a description of lager brewing were to be included.

This book is recommended as one of the best introductions to the "art" of top fermentation brewing.

E. C. BARTON-WRIGHT.

* *Brewing—Theory and Practice.* Revised and enlarged by E. J. Jeffery, B.Sc., F.R.I.C. Kaye, London, 1956. Pp. 414. Illustrated. 30s. net.

▶ Eighteen hints for reducing heat and power consumption are contained in a memorandum *For the Attention of the Plant Manager* issued by the National Industrial Fuel Efficiency Service. It complements a previous memo on maintenance which was addressed to works engineers.

SMOKE-CURING Salmon and Trout IN THE TORRY CONTROLLED KILN

By C. T. House[1] and C. L. Cutting[2]

A schedule has been elaborated whereby salmon can be satisfactorily smoked in the Torry Research Station controlled mechanical kiln, either split as "kippers" or as sides, in less than 12 hr. compared with up to 48 hr. in the usual commercial kilns. Yields and analyses are given for successive steps in the process including the initial preparation, curing in salt and smoking for fish of various sizes. Sea-trout were also successfully dealt with.

SALMON is normally smoked commercially in a type of kiln which is but a slightly modified form of that usual in the fish smoking trade, depending on the vertical up-draught of sawdust fires burning on the floor. In cold winter weather there is difficulty in reaching the desired temperature by means of the fires alone, and various forms of auxiliary heating, such as gas burners or steam radiators are employed. In warm weather, on the other hand, the external atmospheric temperature is sometimes little below the maximum of between 80° to 85°F. that can be tolerated without spoiling the appearance of the fish by incipient cooking. There is therefore little natural draught, which depends on the difference in the density of the air inside and outside the kiln, and various attempts are made to overcome this by installing fans. The process is thus laborious, hazardous to the product owing to the difficulty of control, and time consuming. In fact, the salmon may spend as long as 48 hr. in the kiln before they are regarded as properly cured. Although the total quantities of salmon smoked are small in relation to those of herrings and white fish, nevertheless most of the production is concentrated in a relatively small number of firms. The scale of their operations and the value of the commodity is therefore sufficient for them to consider favourably the greater measure of control and mechanisation of the smoking process represented by the Torry Research Station fish smoking kiln previously described.[1]

Table I. Chemical Analyses of Commercially Smoked Salmon

Fish No.	Sample (see Fig. 1)	Thickness of piece (in.)	Water (%)	Fat (%)	Salt (%)
1	Thick portion	1½	51·5	20·3	2·9
	Thin portion	¾	—	18·4	4·1
2	Thick portion	1	47·1	22·7	3·5
	Thin portion	⅜	45·9	22·4	4·5
3	Thick portion	—	55·8	15·4	3·2
	Thin portion	—	52·6	12·1	5·4
4	1 (*b*)	0·7	62·4	9·4	2·7
	1 (*a*)+1 (*c*)	0·7	59·8	13·4	2·7
	2 (*b*)	1·2	44·4	13·6	2·5
	2 (*a*)	1·9-0·85	53·6	20·8	2·5
	3	0·9	55·4	11·0	5·5
5	1[3]	1·25	59·8	14·4	4·1
	3	0·5	56·2	9·4	8·5
	1 (*a*)	0·6	63·0	8·5	4·4
	1 (*b*)	0·4	—	10·7	4·2
	1 (*c*)	0·4	52·8	24·3	3·5
	4 (*a*)	0·5	66·4	5·9	3·5
	4 (*b*)	0·4	64·4	10·3	3·2
	4[3]	1·2	59·0	16·2	3·2

As a result of a number of commercial enquiries, experiments were undertaken on the smoking of salmon in the Torry kiln, and some preliminary conclusions and recommendations were issued[2] for the guidance of the trade. As a result a considerable proportion of the smoked salmon producers have turned over to the use of mechanical kilns of the type described. The smaller 10-stone capacity model has been adopted by some small-scale producers.[3] The following account presents in greater detail the results of the experiments on which the recommendations were based. Although several papers have appeared in recent years which describe salmon smoking,[4, 5] it is nevertheless felt that it would still be of practical value to present a detailed account of the experiments in the Torry kiln, and some of the conclusions which can be drawn regarding the process.

EXPERIMENTAL

At intervals over the course of several years, various types of fish including fresh and frozen, home caught and imported salmon, and also a number of sea-trout have been smoke cured. After observations of operations in traditional kilns and several examinations and analyses of the smoked product available on the market (see Table 1), a processing schedule was devised to produce a similar article by smoking suitably salted fish in the 40-stone capacity Torry kiln.[1] The kiln was not usually filled to capacity on account of the expense of the raw material involved, and as a result the humidity was always lower than

[1] Torry Research Station, Aberdeen, and [2] Humber Laboratory, Hull, of the Department of Scientific and Industrial Research.

TABLE 2. PERCENTAGE YIELDS IN THE PREPARATION OF

Fish No.	Description	Date	Weight lb. approx.	Weight g.	WEIGHT (%) OF WHOLE FISH: Ovary	Milt	Liver	Intestines	Heart	Total viscera	Head	Gills	Backbone	Backbone tail and dorsal fin	Flesh from backbone	Total wastage: Kipper	Total wastage: Sides
1	Frozen Scots	13.12.49	6½	[illegible]	3·8	—	—	—	—	—	—	—	—	—	—	12·2	—
2	,, ,,	17.12.49	18½	[illegible]	3·8	—	1·7	3·3	—	—	—	2·2	5·9	—	—	16·1	—
3	Fresh Scots	22.4.50	[illegible]	9155	1·7	—	1·0	2·1	0·2	—	—	2·2	6·4	—	3·7	17·3	—
4	,, ,,	,,	14¾	[illegible]	1·2	—	1·4	3·1	0·2	—	—	2·4	5·4	—	2·8	16·9	—
5	,, ,,	,,	16½	7334	—	0·2	1·3	2·9	0·2	—	—	2·2	5·0	—	2·0	15·0	—
6	,, ,,	,,	14¾	[illegible]	—	0·2	1·2	2·9	0·2	—	—	2·1	5·0	—	2·9	15·3	—
	Average	—	—	—	1·4	0·2	1·2	2·8	0·2	—	—	2·3	5·4	—	2·8	16·1	—
7	Fresh Scots	20·6·50	20¼	9260	1·9	—	1·4	2·3	0·2	—	6·1	2·1	—	10·8	—	—	24·9
8	,, ,,	,,	16¼	7410	1·7	—	1·8	3·5	0·3	—	5·4	1·7	—	9·9	—	—	25·1
9	,, ,,	,,	14¼	[illegible]	1·7	—	1·7	2·4	0·2	—	5·3	1·9	—	9·9	—	—	23·0
10	,, ,,	,,	14¼	6410	1·3	—	1·4	2·6	0·2	—	5·1	1·9	—	10·7	—	—	24·5
	Average	—	—	—	1·7	—	1·6	2·7	0·2	—	5·5	1·9	—	10·3	—	—	24·9
11	Frozen 8½ months at −22°F.	22.6.50	13¼	6041	2·2	—	1·6	2·5	0·1	[illegible]	5·2	1·9	—	9·9	—	—	24·9
12	Trout	22.6.50	2	936	—	—	1·9	5·5	0·2	—	—	1·7	6·2	—	—	15·3	See
13-17	5 Trout	,,	10¼	4740	—	—	2·5	6·2	0·2	—	—	1·7	9·1	—	—	20·4	Table 7
	Average	—	—	—	—	—	2·3	6·1	0·2	—	—	1·7	8·6	—	—	19·6	
18	Fresh Scots	29.7.50	15	6763	—	—	—	—	—	—	—	—	—	—	—	—	27·3
19	,, ,,	,,	14	6353	—	—	—	—	—	—	—	—	—	—	—	—	24·1
20	,, ,,	,,	14¾	6712	—	—	—	—	—	—	—	—	—	—	—	—	24·4
21	,, ,,	,,	14¾	6711	3·7	—	1·1	—	—	—	4·5	2·1	—	—	—	—	26·3
22	,, ,,	,,	14¼	6661	2·1	—	1·5	—	—	—	5·4	1·8	—	—	—	—	24·9
	Average	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25·4
23	Trout	1.8.50	2	[illegible]	—	—	—	—	—	—	—	—	9·7	—	—	19·1	
24	,,	,,	2	[illegible]	—	—	—	—	—	—	—	—	—	—	—	22·3	
25	,,	,,	2	954	—	—	—	—	—	—	—	—	6·6	—	—	15·2	[illegible]
26	,,	,,	2¼	1047	—	—	—	—	—	—	—	—	8·2	—	—	20·4	Table 9
27	,,	,,	2¼	1150	—	—	—	—	—	—	—	—	7·7	—	—	[illegible]	
28	,,	,,	2⅔	1203	—	—	—	—	—	—	—	—	8·2	—	—	20·4	
	Average	—	—	—	—	—	—	—	—	—	—	—	8·1	—	—	19·5	
29	Frozen Polish	23.11.50	35¼	[illegible]	—	—	—	—	—	—	—	—	—	—	—	—	35·2
30	Frozen gutted	5.3.51	12¼	5578	—	—	—	—	—	—	—	—	—	—	—	—	21·6
31	Frozen Scots	11.3.51	16	[illegible]	—	—	—	—	—	—	—	—	—	—	—	—	24·3
32	Frozen Polish River ... ,,	,,	[illegible]	3641	—	—	—	—	—	—	—	—	—	—	—	—	27·3
33	Frozen Danish ... ... ,,	,,	12¼	5637	—	—	—	—	—	—	—	—	—	—	—	—	23·9
34	Sea-caught gutted ...	14.6.51	11¾	5156	—	—	—	—	—	—	—	—	—	—	—	—	22·8
35		20.8.51	15	6772	—	—	—	—	—	8·3	—	—	—	—	—	—	33·5
36		,,	[illegible]	[illegible]	—	—	—	—	—	8·3	—	—	—	—	—	—	31·5
37	Frozen Scots, Male (full)	26.10.51	21	9439	—	—	—	—	—	8·7		12·1	—	—	—	—	34·2
38	,, ,, ,, ,,	,,	17	7649	—	—	—	—	—	8·4		10·5	—	—	—	—	31·4
39	,, ,, ,, ,,	,,	14	6216	—	—	—	—	—	7·2		14·4	—	—	—	—	35·2
40	,, ,, ,, ,,	,,	13	6016	—	—	—	—	—	—		—	—	—	—	—	35·3
41	,, ,, ,, ,,	,,	15	6752	—	—	—	—	—	—		—	—	—	—	—	32·4
42	Frozen Scots, Female (ripe)	,,	12	[illegible]	23·2	—	—	—	—	4·6		9·8	—	—	—	—	49·7
43	Ditto	,,	14¼	6402	22·5	—	—	—	—	4·9		—	—	—	—	—	49·2
44	Male	31.7.51	15	[illegible]	—	2·7	1·5	—	—	7·2	—	—	—	—	—	—	26·4
45	,,	,,	12	[illegible]	—	1·8	1·6	—	—	7·7	—	—	—	—	—	—	28·3
46-52	7 Trout...	31.7.51	2	[illegible]	—	—	—	—	—	12·7	—	—	—	—	—	22·6	—

Fish No.	Salting: Time (hr.)	Salting: Final loss of wt. %	Smoking: Time (hr.)	Smoking: Final loss of wt. (%)	Loss on unsalted dressed wt. %	Loss on whole fish %	COMMENTS ON PRODUCT
1	25	9·6	(1)	14·3	21·0	30·8	Acceptable commercially.
2	25	5·4	13¾	9·6	14·5	30·7	Too soft in thickest part.
3	39	11·0	13	8·9	19·0	33·0	Perhaps slightly undercured in thickest part.
4	39	12·4	13	10·4	21·5	34·8	Good cure.
5	39	11·3	13	8·7	19·1	31·2	,, ,,
6	39	11·4	13	10·1	20·4	32·6	,, ,,
	39	11·5		9·5	19·9	32·9	
7	See Table 4		—	—	—	—	
8	46	9·8 9·8	11	6·8 7·5	15·7 16·5	37·3	Good cure.
9	46	9·4 9·5	11	7·4 [illegible]	16·1 16·8	35·6	,, ,,
10	46	9·1 8·3	11	7·4 7·4	15·8 15·3	35·4	,, ,,
	—	9·3		7·4	16·1	36·1	
11	36	7·7 7·9	8½	7·2 7·0	14·4	35·8	Good cure.
12	See Table 7		11	—	—	—	Very good product.
13-17			—	—	—	—	
			—	17·1	19·0	35·0	
18	41	9·3 9·8	11	7·9 9·3	16·5 18·2	39·9	Good cure.
19	41	9·5 10·2	11	7·8 8·4	16·6 17·7	37·1	,, ,,
20	41	7·9 8·2	11	7·1 7·5	14·4 15·4	35·7	,, ,,
21	41	10·3 10·3	11	[illegible] 8·9	18·2 18·3	39·7	,, ,, ,, ,,
22	41	9·7 9·6	11	8·0 8·1	16·9 16·9	37·6	
	—	9·5	—	8·2	16·9	38·0	
23			11	14·8	18·5	34·1	Good product.
24			11	15·6	18·7	37·3	,, ,,
25	See Table 9		11	13·8	17·2	29·8	,, ,,
26			11	15·2	17·5	34·4	,, ,,
27			11	13·7	14·2	32·8	,, ,,
28			11	14·2	16·7	33·7	,, ,,
			—	14·5	17·6	33·7	
29	46	9·6	11	9·3	18·0		Poor product owing to bad cold storage; rather salty in thin part, not excessively.
30	36	10·7	8½	—	18·3	35·5	Perhaps slightly undercured; poor product owing to effects of bad cold storage.
31	40	[illegible] 8·5	9½	7·1 6·6	15·3 14·5	35·6	Perhaps more heavily cured than normal.
32	29	8·4 7·6	9½	6·9 7·3	14·7 14·3	37·9	Perhaps somewhat overcured.
33	32	8·6 10·3	9½	7·3 7·9	15·3 17·4	36·3	Rather indifferent, owing to poor cold storage.
34	See Table 7		13¾	12·8			Fish apparently in poor biological condition.
35	25	6·0 5·0	[illegible]	7·0 6·5	11·8 10·4	41·0	Fish rather emaciated and in poor condition; not really first-class product.
36	25	8·2 7·7	[illegible]	8·6 8·4	15·0 14·5	40·6	
37		10·1	9	—	21·1 21·1	48·0	Fish rather too mature biologically for a first class product in flavour and appearance.
38		8·4	[illegible]	—	23·7 24·7	42·7	
39		12·1	[illegible]	—	21·2 20·0	[illegible]	
40		9·9	[illegible]	—	21·0 20·0	48·1	
41		—	9	—	—	—	
42		12·4	[illegible]	—	—	63·4	
43		9·5	[illegible]	—	—	59·8	
44	25	7·4 7·8	8	6·9 6·7	14·2 14·1	37·3	Good cure.
45	25	5·3 8·3	[illegible]	6·6 7·8	14·7 14·8	39·0	,, ,,
46-52		—	—	—	—	—	

would be the case with a full load, and often only between 30 and 50% of saturation. To compensate for this a very low air speed of the order of only 3-4 ft. per second was usually employed. It was considered from previous experience that the rate of drying would approximate roughly to that likely to be obtained in a fully loaded kiln of the same size operating with a speed of circulation of about 6 ft. to 8 ft. per sec. The smoke density was not measured, but generally it was about the same as in making kippers and "finnan" haddocks. Normally fires were lit of the Torry multi-hearth type previously described and illustrated.[1] Samples of fish were taken from time to time at various stages in the processing chain for analysis, after skinning, for water, fat and salt contents, by normal chemical methods.

The salmon is a fish with a fat content in the flesh which fluctuates seasonally from a high value of about 20% when sexually immature to a value of only 2 or 3% after spawning when it has been fasting for some time.[6, 7] In addition the fat is not uniformly distributed throughout the fish, being mainly concentrated just underneath the skin and in the abdominal cavity. This leads to difficulty in obtaining a representative sample for chemical analysis. Trout is usually much less fatty than salmon, often in the 3 to 5% range. The method of sampling a side of salmon is shown in Fig. 1. In order to follow the penetration of salt into, and the extraction of water from, the thickest part of the flesh, a lateral section was first cut which was then sliced longitudinally to give three portions, which were minced and analysed separately. Duplicates usually differed by not more than about 0·5% in water content, 0·2% in fat and 0·1% in salt.

RESULTS

Initial preparation

Salmon is normally marketed whole, including viscera. It is therefore first of all necessary to eviscerate the fish by means of a knife. The roe of the female fish,

if not so far developed that it is too soft to handle easily, is sometimes smoked as a delicacy and the milt of the male is the source of the protamine, "salmine," which has been used for the preparation of "zinc protein insulinate." Apart from a few scattered values in the literature there are very few published data giving the relative proportion of the various organs of salmon and trout. The results collected in the present series of experiments are summarised in Table 2, which also gives the yields for various steps in the processing chain. Owing to the loss of blood, adherence of water, etc., the totals do not always tally exactly.

Salmon are smoked, either, in the "kipper" split form or as fillets, or sides. A 15 lb. fish is about 35 in. in overall length, 4 in. thick in the thickest part, and $6\frac{1}{2}$ in. in breadth. When cut into sides the dimensions are about 30 in. × $7\frac{1}{2}$ in. × $1\frac{1}{2}$ in. thick in the thickest part, tapering down to about $\frac{3}{16}$ in. towards the tail end. In the "kipper," the whole fish is split from the dorsal side leaving the head on, but removing eyes, gills and most of the backbone. About 3 in. of the backbone is left near the tail to reinforce the flesh during subsequent handling (see Fig. 2). This process incidentally, is the origin of the term "kipper" as applied to herring, where it is a very much more recent introduction.[8] Nowadays, most salmon in Britain are smoked as sides, for which the fish is first headed and then the two sides cut carefully from the bone, retaining the belly walls and shoulder bones. Table 2 shows that the wastage involved in preparing salmon for smoking as "kippers" is about 16% and as "sides" about 25%. However, in fish which are about to spawn, the latter figure increases to about 35% for males and 50% for female fish, in which the roe can amount to nearly 25% of the total weight of a 12 lb. fish. Trout of about 2 lb. in weight have a higher proportion of viscera than salmon and the wastage on splitting amounts to 20 to 22%.

In preparing fish for smoking it is important that the blood be carefully squeezed from the veins and washed away. The water used in washing should preferably be ice-cold, as this lowers the temperature of the fish and so minimises loss of oil; it also assists in retarding deterioration and softening. If the fish is not to be split and salted at once, it should be kept covered with ice, and if subsequently it has to be held over a period, it should be kept in a chill store at below 40°F.

Salting

The salting procedure is as important for obtaining a satisfactory product as the smoking process itself. Although there is a variety of special, supposedly secret, recipes for the composition of the pickle used, it has been found that best fine dairy salt gives perfectly good results in both dry-salting and pickling in brine. It is unnecessary, except for subtle differences of flavour, to mix the salt with any of the other ingredients sometimes mentioned, such as saltpetre, demerara sugar, molasses, and occasionally even small proportions of rum or whisky.

The overall "curing," or preservation process, is the combined result of loss of moisture, and uptake of salt and smoke constituents, all of which contribute to delaying spoilage processes, which are chiefly the effect of the multiplication of micro-organisms. The osmotic changes resulting from the contact of fish flesh with salt are rather complicated.[9, 10] The general pattern for herrings is that in dry-salting there is an extraction of liquor from the flesh tissue which forms a brine if it is allowed to collect and ultimately flows back into the fish,. which after an initial fall end up substantially unchanged in weight. If, however, the brine is allowed to drain away, the weight decreases by nearly 30% and then remains steady after about two days in the case of herring fillets, although exchange of water and salt continues for a further week or two. When fish are salted by pickling in a concentrated brine, the initial uptake of salt is more rapid than it is in dry-salting. It was suggested that this might be due to the actual area of contact with the fish being much greater with liquid brine than with granular salt. However, the latter begins to extract water and gets wet almost at once and it was not found in the present experiments that the curing of salmon was appreciably quicker with moistened salt. With herrings[9] there was an initial loss of weight in the stronger brines, which was reversed after a few days. In dilute brines there was little or no initial decrease and the subsequent back flow of brine into the tissue resulted after a week or more in an increase of up to about 30% above the initial weight.

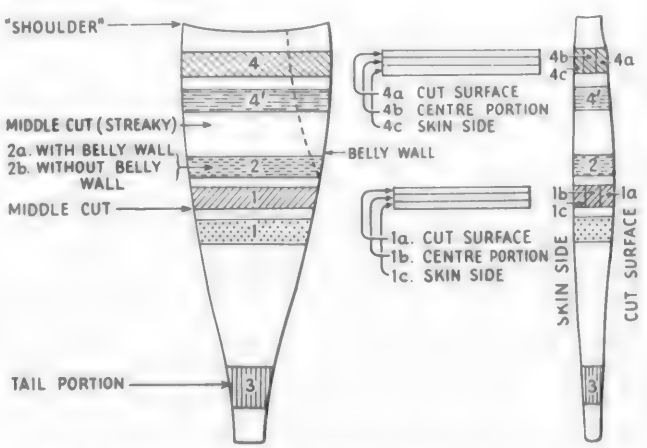


Fig. 1. Side of salmon (diagrammatic) showing samples for analysis.

Fig. 2. Salmon smoked in the " kipper " split form. The whole fish is split from the dorsal side, leaving the head but removing eyes, gills and all except about 3 in. of the backbone near the tail.

The fact that saturated brine begins to extract water from fish flesh practically at once is shown by the figures given in Table 3 of the weight changes in the case of similar pieces of cod (which of course has practically no fat to impede penetration) kept immersed in brines of 71% (i.e. 18½ lb. of salt in 100 lb. of brine) and 100% saturation (i.e. 26·4 lb. of salt in 100 lb. of brine). No allowance was made for brine adhering to the flesh.

Table 3. Percentage Gain (+) or Loss (−) in Weight of Pieces of Cod in Strong Brine

Time of immersion	Strength of brine 71%	100%
10 min.	+0·5	0·0
4 hr.	0·0	−5·5
22 ,, ...	−3·0	−11·8

Since salmon is so much larger than herring, it would be expected that the changes outlined above would take place considerably more slowly. Obviously the thicker the piece of flesh which salt has to penetrate, the slower is the overall rate of uptake. The tail end of a fillet or side therefore picks up salt faster than the thicker parts and would in fact become too salt by the time the rest of the flesh was adequately salted. Thus, samples of commercially smoked sides of salmon contained 2½ times as much salt in the tail part as they did near the thickest parts (see Table 1). It will be seen that there was also a considerable variation in saltiness from one fish to another.

Table 4 shows that the rate of extraction of water during dry-salting which runs roughly parallel with uptake of salt (see Figs. 3 and 4) is twice as fast in the tail half as in the thicker half. This tendency is to some extent counteracted by the normal commercial practice of scoring the skin transversely at the thickest part, either of the split fish (see Fig. 5) or sides, to speed up the rate of penetration of salt there. Cuts of about 2 in. in length are made at intervals of about 3 in. for about ⅔ of the length of the sides; leaving the thinner parts towards the tail unscored. The cuts made by the knife in " scoring " only penetrate the skin, except at the very thickest part of the flesh where they are deeper to facilitate salt penetration. Alternatively, a strip of the skin about 1 in. to 1½ in. in breadth may be removed along the brown lateral band running the whole length of the side of the fish. However, exposure of the flesh just underneath the skin in this way increases the risk of oxidation of the fat with consequent possibility of the development of rancid flavour. No appreciable difference was observed in rate of cure produced by scoring as compared with stripping. Some curers attempt to overcome the difficulty of excessive saltiness of the tail portion by salting on open shelves or racks and allowing about 6 in. or so of the tail to project from the shelf. It was noticed (see Table 5) that the salt concentration throughout the fish is much more uniform after smoking, presumably as a result of diffusion through the flesh. It was therefore presumed that in the case just mentioned the tail portion then relies for its cure on the

Table 4. Percentage Losses of Weight in Salting and Smoking of Head and Tail Halves of Salmon Sides

Fish No.	Weight of portion g.	Loss in salting (%) Time (hr.) 22	24	36	46	After washing and dripping	After light brining and washing	Loss in smoking (% of salted weight) Time (hr.) 3	5	6	9	10	11	13¾	After cooling
7 (a) head	2025	6·0	—	—	10·4	11·4	9·8	—	—	4·7	—	6·8	7·8	—	8·1
tail	1090	12·5	—	—	16·1	15·9	14·3	—	—	4·7	—	6·9	8·7	—	8·7
(b) head	2305	5·8	—	—	10·7	10·8	9·9	—	—	3·8	—	5·6	7·2	—	7·2
tail	1050	12·6	—	—	18·5	16·2	14·8	—	—	5·9	—	8·3	10·1	—	10·1
8-10 average	—	8·4	—	—	10·2	10·5	9·3	—	—	4·3	—	6·2	7·4	—	7·4
29 (a) head	3110	—	—	—	12·1	10·4	—	3·0	—	6·0	—	—	—	—	10·3
tail	1520	—	—	—	12·5	10·2	—	3·3	—	5·8	—	—	—	—	11·7
(b)*	5430	—	—	—	11·7	9·6	—	2·4	—	5·2	—	—	—	—	9·3
30 (a) head	1295	—	5·5	6·8	—	10·1	7·9	—	5·3	—	7·6	—	—	—	—
tail	763	—	9·3	10·9	—	16·2	11·8	—	6·3	—	10·0	—	—	—	—
(b)*	2160	—	8·1	10·4	—	12·4	10·7	—	5·3	—	8·5	—	—	—	—
34 (a) head	895	—	—	—	—	—	—	—	6·4	—	9·0	—	—	12·2	—
tail	661	—	—	—	—	—	—	—	7·3	—	—	—	—	—	—
(b)*	1951	—	—	—	—	—	—	—	6·1	—	9·2	—	—	12·8	—

* Whole side.

diffusion of salt through the flesh from the salted portions. Its preservation is also enhanced by the greater degree of drying incurred in the thinner portion during smoking.

In dry-salting the salt was rubbed lightly into the flesh and also into the scores on the skin side. The first fish or side was laid skin downwards on a layer of salt in a box, covered with salt and the next fish or side placed similarly with the skin down, covered with salt, and so on, packing the fish or sides alternately head and tail. Weights were placed on top of the pile in order to press the fish, or sides, and keep them in shape. There is a progressive shrinkage as the salting proceeds. The fish or sides were removed from the salt from time to time for weighing and sampling for chemical analysis. A correction had to be made for the salt adhering, which in the case of Fish No. 11 in Table 2, for example, was found to amount to about 2·5%. The fish or sides were then washed or soaked for a few minutes in fresh, preferably ice-cold, water, with a few changes, until all surface salt had been removed. They were also usually brined for 10 min. in a light 30% saturated brine, and reweighed. These treatments resulted in partial de-salting of the relatively over-salted tail end and thus contributed to evening out the cure. The fish were then hung or laid skin downwards to drain thoroughly for a few hours in a cool place preparatory to smoking. Over-night hanging in a chill temperature before smoking allowed the surface to "set" well. Alternatively, since a controlled, horizontal flow, smoking kiln of the Torry type was used, the fish were laid to drain on wire mesh trays on which they were subsequently to be smoked.

When salmon were salted by pickling, the split fish or sides were brined in a common salt solution of a strength corresponding to about 70 to 80% of saturation. The fish were then drained and the surface allowed to "set," as already described.

In dry-salting there was a general parallelism between size of fish and rate of cure as represented by the loss of weight of the fish, which is a useful index by which to follow the process. However, there are a number of factors which preclude a precise correlation of the two, such as variation in fat content between fish, and also the extraction of water from badly cold stored and already partially dehydrated fish is perhaps somewhat slower. There is at times a 15 to 20% difference in the rate of loss of weight for the two fillets from the same fish (e.g. Fish No. 8). This variability is evened up to a considerable extent by the washing procedure adopted. However, the difference between the thin and thick parts of a fish still remains (see Tables 5 and 6). Fig. 3 shows that, despite individual variations, the weight loss during the first 24 hr. of dry-salting for fish of about the same size is twice as great as that occurring during the second 24 hr. Broadly speaking, in order to end up with a loss of weight of 8 to 10% as a result of the salting process, which it was concluded from the experiments was about the optimum for keeping quality and palatability, it was necessary to dry-salt an 8 lb. fish for about 24 hr. and a 15 to 20 lb. fish for up to 40 hr. As might have been

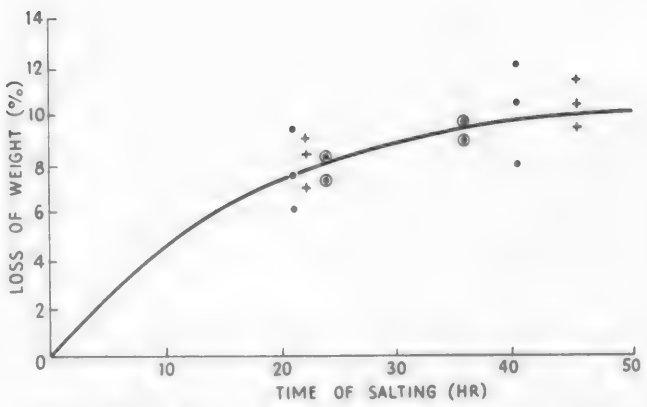


Fig. 3. Weight changes during the dry salting of salmon sides.

+ Average and extreme losses of weight of sides of 3 x 14 to 16 lb. fish (Fish Nos. 8-10)-20.6.50.

• „ „ „ „ „ weight of sides of 5 x 15 lb. fish (Fish Nos. 18-22)-29.7.50.

⊙ Extreme losses of weight of sides of 1 x 13 lb. fish (Fish No. 11)-22.6.50.

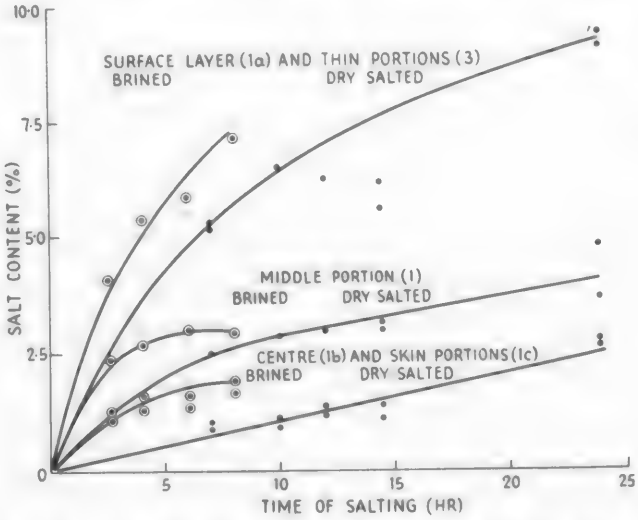


Fig. 4. Rate of salt uptake of sides of 20 lb. salmon in solid salt and brine.

Fig. 5. Split, smoked salmon with the skin scored transversely at the thickest part to speed up the penetration of salt there. The normal tendency is for salt penetration to be quickest near the tail.

expected it made little difference to the rate of cure whether the fish were kipper split or salted as sides.

Tables 5 and 8 and Fig. 4 show clearly that both for dry-salting and pickling in brine the rate of penetration of salt is much slower on the skin side than at the cut surface, whether owing to the obstruction of the skin, or the fatty layer just underneath it, or both. No doubt the variability of oil content from fish to fish and seasonally affects the speed at which salt penetrates, but insufficient analyses have been made for any systematic conclusion to be drawn.

Table 7 shows that salmon and trout salted by immersion in brine alone actually increase in weight by a few per cent., and Table 8 gives the chemical analyses of the same salmon, which shows that after 2½ hr. brining it picked up only 2 to 3% of salt, *i.e.* appreciably less than fish dry-salted as above. Table 5 shows that about 6 hr. brining are required for a product comparing in salt content with fish dry-salted for 24 hr. Table 9 shows the weight changes incurred in trout by combining an hour or two of dry-salting followed by an immersion for an hour or so in strong brine, a procedure which gave satisfactory results.

Smoking

"Kipper" split salmon were conveniently hung by twine tied to the tail for draining and smoking. A skewer was inserted through the flesh just under the shoulder bones to keep the fish open, thus permitting even drying and smoking as well as preserving the shape (see Fig. 5). Fillets or sides were hung by the loop of a piece of twine passed through the flesh beneath the shoulder bones and the pectoral fin (which reinforces the side and is therefore not removed). It was found that a perfectly satisfactory result could be obtained when smoking in a kiln of the Torry horizontal flow type by laying the sides skin

Table 5. Chemical Analysis of Fresh, Salted and Smoked 15 lb. Salmon

Side No.	Salting: Type	Salting: Hr.	Hours Smoking	SAMPLE SECTION: 2 (a)* Thickness (in.)	2 (a)* Water %	2 (a)* Fat %	2 (a)* Salt %	1 (a)* Thickness (in.)	1 (a)* Water %	1 (a)* Fat %	1 (a)* Salt %	1 (b)* Thickness (in.)	1 (b)* Water %	1 (b)* Fat %	1 (b)* Salt %	1 (c)* Thickness (in.)	1 (c)* Water %	1 (c)* Fat %	1 (c)* Salt %	3* Thickness (in.)	3* Water %	3* Fat %	3* Salt %
4	Fresh	—		1·5	63·2	14·5	—																
,,	Dry ...	7		1·4	57·8	15·5	2·5	0·4	62·1	16·7	5·3	0·5	65·8	7·5	1·0	0·5	49·2	15·8	0·9	0·5-0·65	64·9	6·3	5·2
,,		10		1·3	58·1	15·8	2·9	0·5	60·3	7·4	6·5	0·4	[illegible]	5·5	1·1	0·4	[illegible]	17·9	0·9				
,,	,,	24		1·1	56·1	15·4	4·9	0·3	56·4	7·3	9·1	0·4	63·4	6·7	2·8	0·4	55·8	17·0	2·7				
5	Fresh	—		1·5	60·4	12·8	—																
,,	Dry ...	12		1·25	[illegible]	15·3	3·0	0·4	55·5	11·3	6·3	0·4	64·1	7·3	1·2	0·4	55·0	19·3	1·4	0·4-0·7	[illegible]	[illegible]	7·5
,,	,,	14½		1·2	54·1	16·1	3·0	0·35	58·7	8·7	5·6	0·35	63·1	7·3	1·4	0·4	57·0	19·6	1·1				
2	Dry ...	14½		1·2	56·7	13·9	3·2	0·4	57·7	[illegible]	3·6	0·4	62·5	7·0	3·4	0·4	57·3	16·4	1·2	0·5-0·7	58·4	7·2	6·2
1	Dry ...	24		1·2	54·8	19·4	3·7	0·4	58·2	8·9	4·3	0·4	63·2	7·3	3·8	0·4	56·1	18·3	3·0	0·5	55·6	7·1	9·4
6	Fresh	—		1·35	62·8	14·0	—																
,,	74° brine	2½		1·4	[illegible]	11·7	2·4	0·4	70·1	2·6	4·1	0·4	67·9	4·7	1·1	0·6	65·0	14·6	1·2				
,,	,, ,,	4		1·5	[illegible]	11·9	2·7	0·375	64·1	8·4	5·4	0·625	63·4	7·5	1·6	0·5	59·2	19·3	1·8				
,,	,, ,,	[illegible]		1·5	47·7	12·7	3·0	0·375	64·0	7·1	5·9	0·625	64·1	7·0	1·6	0·5	57·0	18·3	1·4				
,,	,, ,,	[illegible]		1·55	56·7	[illegible]	2·9	0·5	62·2	8·3	7·2	0·5	[illegible]	8·7	1·7	0·5	[illegible]	20·0	1·9				
3	74° brine	4		1·3	57·1	17·9	1·3					0·4	65·1	7·8	2·7	0·5	[illegible]	18·4	2·2	0·6-[illegible]	61·2	7·7	5·1
8 (pieces)	100° brine	6½		1·35	59·3	16·7	2·4	0·35	61·6	7·8	6·7	0·35	67·2	8·1	1·2	0·45	60·3	19·6	0·5				
,,	Wet salt	6½		1·25	[illegible]	16·7	1·9	0·45	63·1	7·2	4·3	0·4	[illegible]	8·2	4·9	0·4	61·1	20·0	0·6				
,,	,, ,,	6½		1·05	64·3	7·9	4·4	0·3	61·6	3·7	7·6	0·35	[illegible]	3·9	2·0	0·4	63·0	12·9	1·6				
,,	Dry salt	6½		0·9-0·4	62·1	10·4	4·2	0·35	56·9	11·9	6·5	0·35	[illegible]	9·7	1·3	0·35	57·7	21·4	1·0				
7 (pieces)	Fresh	—		1·25	61·6	12·0	—																
,,	Brined	6	11½					0·4	[illegible]	[illegible]	4·6	0·4	63·6	6·6	3·9	0·5	[illegible]	17·8	3·2				
,,	,,	4	11½					0·4	59·5	[illegible]	[illegible]	0·5	63·1	[illegible]	3·1	0·4	53·2	21·2	2·4				
,,	,,	2½	[illegible]					0·3	64·3	4·8	3·5	0·3	65·1	5·2	3·4	0·4	[illegible]	16·1	2·8				
,,	,,	8	11½					0·4	52·4	10·1	7·0	0·4	63·8	5·7	4·2	0·4	57·4	16·0	3·0				
,,	,,	2½	8½																	0·6-[illegible]	62·8	7·5	4·2

* See Fig. 1.

downwards on wire mesh trays. The mesh markings on the skin were not an appreciable disfigurement of the product. Moreover, provided that the thickest end faced the air stream there appeared to be no need to turn the fish round during smoking. However, with a full load in the kiln, reversal of flow would probably have been necessary in any case to counteract gradients in conditions in the direction of flow. Oak, or similar hardwood, chips and sawdust gave a very good result. A small proportion of juniper wood was usually burnt to impart an attractive, aromatic flavour. The yield on smoking is given in Table 2 and some of the results are plotted in Fig. 6. For an average "mild" cure, low fires were employed, giving an initial smoke temperature not exceeding 80°F. At this temperature the loss of oil is minimised. After about six or seven hours in the Torry controlled kiln, the cut surface of an average 15 lb. fish was fairly dry. The temperature was then raised gradually to 85°F. for a further few hours, depending on the size of fish or sides. The centre flesh of the thick part was now fairly resilient to the touch but not too hard. During the final hour or so the temperature of the kiln was gradually raised to about 100°F. This brings some of the oil to the surface, which improves the appearance of the smoked article.

It will be seen from Fig. 6 that the temperature schedule operated resulted in the rate of loss of weight being fairly constant throughout the cure. For a side from a typical 15 lb. fish, the rate of evaporation was about 0·7% per hour. For an 8 lb. fish the rate of loss was a little over 1% per hour. Tail ends dried somewhat more quickly than the thicker parts and Fig. 6 also shows that 2 lb. trout cured at the rate of about 1·5% per hour.

If after smoking for a period at 85°F. the flesh of the centre part of the thickest portion felt rather flabby and soft (*e.g.* due to undercuring in salt) whilst the surface was somewhat hardened, a satisfactory product could be obtained if the sides were cooled off and

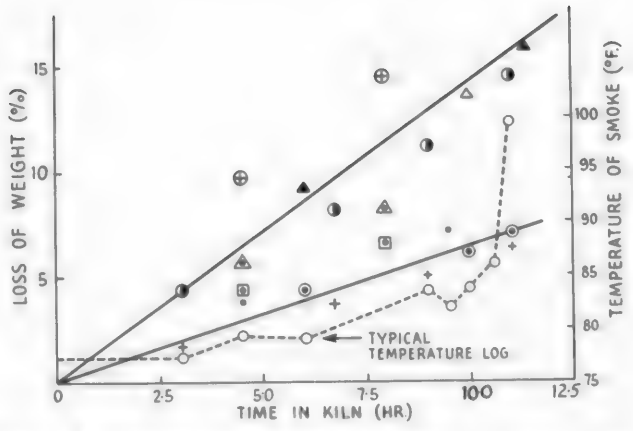


Fig. 6. Rate of drying of salmon during smoking in " Torry " Kiln.

- • Average of 4 x 14 to 20 lb. salmon (Fish Nos. 3-6) Kipper split 22.4.50.
- ◉ „ „ 3 x 14 to 16 lb. „ („ „ 8-10) Smoked as sides, 22.6.50.
- \+ „ „ 5 x 14 lb. salmon (Fish Nos. 18-22), smoked as sides, 29.6.50.
- ⊡ 1 x 15 lb. salmon (Fish No. 34) smoked as sides, 20.8.50.
- ◬ 1 x 8 lb. „ („ „ 35) „ „ „ „ „ „
- ▲ Average of 6 x 2 lb. trout (Fish Nos. 12-17) Kipper split, 22.6.50.
- ◑ „ „ „ „ („ „ 23-28) „ „ 1.8.50.
- ⊕ „ „ „ „ („ „ 45-51) „ „ 31.7.51.

Table 6. Chemical Analyses of Thick and Thin Portions of Salmon During Curing

(See Table 4 and Fig. 1)

Fish No.	Portion	Raw		Salted			Portion	Smoked		
		Water (%)	Fat (%)	Water (%)	Fat (%)	Salt (%)		Water (%)	Fat (%)	Salt (%)
7	Head	69·4	8·3	57·5	9·9	7·4		55·5	10·3	4·5
	Tail	71·7	8·7	59·2	7·1	7·3		55·6	8·8	6·9
29	2 (*a*)	68·8	10·6	58·7	12·5	6·9	1	55·8	11·9	6·4
	1 (*b*)	73·9	2·8	—	—	—	1 (*a*) and 1 (*c*)	65·5	7·2	3·9
							1 (*b*)	68·0	4·9	3·6
							2 (*b*)	55·4	17·5	6·3
							3	59·2	5·5	5·5
30	1	63·4	17·3	—	—	—	3	57·0	9·6	8·2
							1	51·6	20·6	4·5
							1 (*a*)	—	5·4	4·5
							1 (*b*)	—	6·4	3·7
							1 (*c*)	49·6	24·5	4·1
Small fish							Thick	47·0	22·4	3·5
							Thin	46·0	22·4	4·5
Large fish							Thick	51·5	20·1	2·9
							Thin	48·0	19·2	4·1

Table 7. Percentage Gains of Weight of Salmon and Trout Salted in 74° Brine

Fish Sample		Gain in brining (%)		
Type	Weight g.	1 hr.	2 hr.	2½ hr.
Salmon No. 34 Whole side ...	1970	—	0·0	0·2
„ „ head portion ...	900	—	1·0	1·0
„ „ tail portion ...	776	—	0·4	—
Trout Nos. 12-17	Average 900	2·6	—	—

Table 8. Analysis of Salmon (No. 34) Salted by Pickling in 74° Brine

Sample	Thickness (in.)	Water (%)	Fat (%)	Salt (%)
Raw fish	1·6	47·2	22·3	—
Brined 2 hr.	1·4	52·6	16·3	2·4
„ 2½ hr.	1·4	47·3	19·7	2·4
Smoked fish				
1	1·4	41·4	24·8	2·9
3	0·5	51·1	13·3	3·4
1 (*a*)	0·5-0·2	47·0	24·5	3·1
1 (*b*)	0·3	52·1	13·9	2·1
1 (*c*)	0·3-0·1	41·9	37·4	1·7

allowed to "pine" or "sweat," as it is termed in the trade. The hardened surface then became moist again, and the fish could be re-smoked at a temperature of 80°F. This treatment helped to cure the flesh in the centre of the fish. After this the temperature was raised gradually to 100°F. as before.

Pickle-salted fish, which were moister to begin with, required a preliminary period of drying in the kiln with circulating air at ordinary temperatures before they were dry enough for smoke to be applied. If dried by smoking in the kiln all the time such fish would be excessively smoky in flavour.

To produce the same results as described above in the ordinary natural draught smoking kilns, a considerably longer period of smoking is required, sometimes as long as 48 hr., depending on the construction of the kiln, the size of the fish and the atmospheric conditions. As in the mechanical kiln, however, the temperature of the smoke cannot be allowed to exceed about 80°F. to 85°F. until towards the end of the process.

It was concluded that for an attractive mild cure that will keep fairly well, and slice easily, without however being too dry, the loss of weight to be aimed at in smoking should be as follows:

If dry-salted (incurring 8 to 10% loss of weight in the salting process) another 7 to 9% should be lost during the smoking process, making about a 17% loss in all. If pickled in 70° to 80° brine, when there is no appreciable change in weight, the same total of 17% should be lost altogether during the hanging preparatory to smoking, and in the smoke kiln.

In order to cure the thicker parts of the fish or side adequately, the thinner tail parts (*i.e.* from, say, the vent downwards) will normally be somewhat over-cured, and more salty in flavour than the thicker parts. This could be avoided in the case of large fish if the thinner parts were cut off and cured separately.

The mechanical kiln cannot completely overcome difficulties introduced by climatic conditions. In warm weather the temperature of the fresh air intake is still liable to be in the neighbourhood of 80°F. and care has to be exercised to ensure that the smoke passing over the fish is not so hot as to "plot" them, *i.e.* to dull the surface and soften the flesh by partial cooking, so that it cannot be sliced properly. However, the induced draught over the fish results in a greater rate of evaporation than is the case in the traditional kiln depending on natural convection, and it is possible to obtain further latitude by installing a fan in the outlet chimney and thus draw in more fresh ventilating air, preferably from a cool part of the building. In these circumstances it should be possible to cure properly under most conditions.

Table 9. Combined Dry Salting and Brining of 2 lb. Trout

Fish No.	Treatment	Loss of Weight (%)
45-51	1 hr. in dry salt	2·5
„	1 hr. in dry salt+45 min. in 74° brine	3·7
23	2 hr. in dry salt+50 min. in 70° brine, then washed in 30° brine	4·4
24	„ „ „ „	3·6
25	„ „ „ „	4·0
26	„ „ „ „	2·8
27	„ „ „ „	4·1
28	„ „ „ „	2·9
Av.	„ „ „ „	3·6

Frozen salmon

In the course of this work various samples of frozen salmon were used. Some of commercial origin were noticeably inferior in quality at all stages of the process to others that had been stored at a known low temperature of −22°F. (−30°C.). Temperatures at which imported salmon are held before shipping are, of course, not directly under control, but it was obvious that some specimens had suffered deterioration from being stored for too long at whatever the temperature had been. Moreover, the holding temperature for the fish in this country is in some cases as high as 15°F., at which cold storage deterioration due to drying out, rancidity of oil, etc., even in the freshest original fish will begin to be noticeable after only a few weeks, and even at 0°F. within a month or two. Furthermore, even fresh Scots salmon is at times subjected to the detrimental treatment of being placed in a store of this nature to slow-freeze and held for some weeks. It is usual to protect the fish by "glazing" it after freezing and "reglazing" after this glaze has been lost by evaporation, which is more rapid the higher the temperature. However, glazing in itself, although it protects the fat from oxidation, does nothing to arrest changes in the protein, resulting in poor texture and excessive "drip" on thawing, which also develop more rapidly the higher the temperature. On the other hand Fish No. 11 (see Table 1), which had been rapidly frozen soon after catching, losing about 1% by weight, which was more than replaced by glazing, and was then stored at −22°F. (−30°C.), with reglazing after 7 months, was still practically perfect when thawed. It had lost practically no weight on balance, and gave an excellent smoked product after a total period of 8½ months.

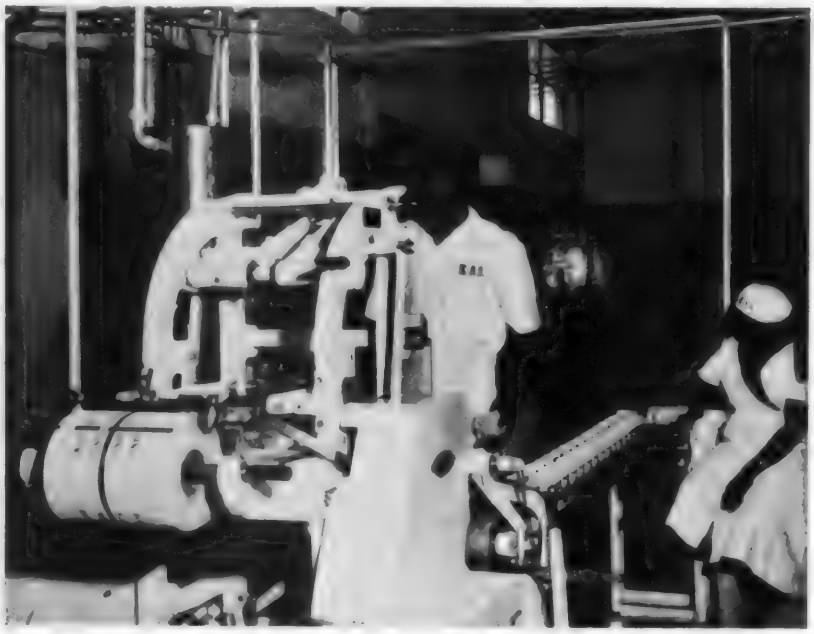
(*Turn to p.* 439)

EAST AFRICA'S FIRST MARGARINE PLANT

THE new £120,000 margarine plant of East African Industries, Ltd., in Nairobi, is the first in East Africa. The main ingredients are all locally produced: groundnut oil from Tanganyika, cottonseed oil from Uganda, sunflower and coconut oil from Kenya.

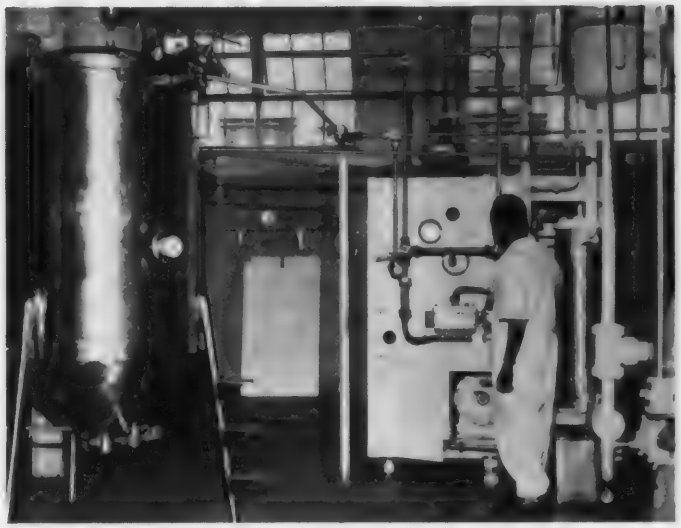
The venture is a joint one between Unilever, Ltd., controlling East African Industries and the Colonial Development Corporation. The plant manufactures and packs margarine under the trade name *Blue Band*, cooking fat under the name *Kimbo* and cooking oil under the name *Kimoil* for the large potential African market. East African Industries undertook production of certain commodities which were in short supply during the last war and has already built up a large market for its vegetable cooking fat and oil.

The new factory is one of Unilever's most modern tropical margarine plants. The group already operates two similar margarine factories in West Africa, and similar installations are to be built in other parts of the world.



PACKING. Semi-liquid margarine is pumped from the Votator to this German-made soft-butter wrapping machine and packed in vegetable parchment laminated aluminium foil at a rate of 40-50 packs per min. By the time the packs have reached the end of the conveyor belt the margarine is almost solid.

Fats and oils are brought into the works from the nearby refinery and are weighed into vessels for blending with lecithin, monoglycerides and other ingredients. Both the oil phase and the water phase (a brine solution containing flavouring, etc.) are transferred by a proportioning pump into a Votator. This is a machine of standard design which has been adapted and modified by Unilever to suit their own requirements as regards the texture of the finished product and, to a certain extent, because of the tropical conditions under which the factory operates. In the Votator the oils enter successively a cooling cylinder, a pre-crystalliser, a post-crystalliser and emerge in a semi-solid condition to be pumped through stainless steel pipelines into a German made



(*Left*) **BLENDING. Vegetable oils in the large tank are blended with other ingredients from the smaller vessels by means of an agitator.** (*Right*) **EMULSIFYING. The blended ingredients of oil phase are transferred to the Votator (on the right) by a proportioning pump and together with the water phase are emulsified and further processed. The vessel on the left is for recovery of surplus margarine from the packing machine.**

General view of the factory showing the Votator (*Left*) and the packing unit (*Centre background*). The can-filling plant is in the right foreground.

(Benz und Hilger) soft butter wrapping machine. This wraps the margarine into parchment laminated aluminium foil in ¼-lb. or ½-lb. packs at a rate of from 40 to 50 packs per min. This is the second such machine to be installed by Unilever—there is also one in Holland—and the company finds that although the speed is not particularly high the machine is very suitable for use under tropical conditions and with semi- or unskilled labour. The natural air content of the margarine has already been replaced by nitrogen in a de-aerating plant, and the final product contains no oxygen and consequently has a high shelf life. The packs are intended for sale in towns possessing facilities for cold storage. Margarine intended for other parts of East Africa where there are little or no refrigerating facilities is packed under nitrogen in tins. Unilever guarantee that canned margarine will stay fresh for at least a year.

The packed margarine is conveyed to the low temperature storage room for tempering and solidification at about 12°C. Careful bacteriological control is kept on all ingredients, and samples are regularly sent to the laboratories in England and Holland for analysis.

▶ The 200-year-old history of C. Shippam Ltd., the manufacturers of meat and fish pastes and other food products, is recounted in a beautifully produced brochure illustrated with wood engravings and photographs in colour and monochrome. The story of the family business from its foundation in the 18th century to deal in provisions in Chichester, its expansion during the 19th century and its further growth during the present century are recounted in the first four pages. The remaining 16 pages of the brochure form a pictorial record of the company's situation and environments in Chichester, and the preparation of their products.

▶ Seed crushing and the milling and refining of edible and technical oils form the subject of a handsome illustrated booklet issued by The British Oil and Cake Mills Ltd. Two pages of coloured maps show the principal sources of oil seeds and nuts purchased for the British market during 1955 and the booklet ends with a comprehensive glossary and a flow diagram showing the separation and processing of edible and technical oils.

Advances in Food Technology

BREAD

Waste Whey Protein

The possibility of utilising whey-protein and molasses—waste products of the production of lactose—in the production of bread has been investigated by Polish scientists. Bread with albumin and molasses was found to be not inferior in quality to normal bread or bread with whey added. The yield, appearance, porosity and keeping quality were better than without such additions. The addition of 5% dried albumin and 1% post-lactose molasses raised by 10% the total protein content in rye bread from flour type 800 (about 60%), the content of lysine by 60%, of thiamin by 4%, riboflavin by 40%, and calcium and phosphorus five times and twice respectively. The addition of larger quantities of post-lactose molasses rich in riboflavin and of another factor of high-lysine and B-group vitamin content (*e.g.* dried yeast) will make it possible to obtain a more favourable level of these components in bread—that is, such as to supply with 500 g. of 60% rye bread about 50% of the daily requirement.—S. Jankowski and S. Sujak, *Przemysł Spożywczy*, Warsaw, 1955, **3**, 105-108.

FLOUR

Disinfestation with Gamma Rays

Irradiation methods for insect control in flour and grain not only have a great advantage over chemical fumigation methods in their effect on insect eggs but are also now believed to be economically competitive. Flour can now be irradiated for 80 cents a ton, about the same as the cost of chemical fumigation. This was stated by L. E. Brownell of the University of Michigan at the annual meeting of the American Association of Cereal Chemists. He said that the experimental radiation facility designed and set up by the University could be considered to be a feasible installation for commercial application and might be located in the existing basement of a large flour mill. The system, in which flour in 100 lb. bags is conveyed throughout in a bucket conveyor, could handle 27·2 tons of flour an hour, or 56,600 tons a year if the plant were operated 8 hr. a day, 5 days a week. Gamma radiation is supplied by cooling fuel elements from a nuclear reactor. As these cooling fuel elements have a high gamma activity that decays rapidly, adjustments would have to be made in the speed of the product conveyor during the 2-month period when the elements are used as radiation sources to compensate for this decay. Two fuel elements would be needed to provide a sufficiently uniform radiation field.

A typical cooling element has an average radiation flux of 1 million rep. per hr. at a radius of 3 ft. from the midpoint of the element. The flour irradiation facility at Michigan was designed for a radiation dose of 25,000 rep., which provides an adequate factor of safety as only 10,000 rep. will sterilise flour beetle and granary weevil eggs and also prevent the adults from reproducing. Because of the low level of radiation used, the flour itself is not harmed.

Initial cost of such an installation would be about $38,300 and the plant would cost about $42,200 p.a. to operate. Although designed for the irradiation of flour, it could also be used for meal, mash and other cereal products. In the U.S., insect attack causes damage of over $300 million a year to flours, grains, and cereal products.—*Chem. and Eng. News*, 1956, **34** (26), 3188.

MEAT

Bacteriological Problems of Pre-packaging

Pre-packaging of meat and meat products calls for the observation of certain standards in the selection of the product, the packaging operation, and the storage of the packages. Only high-quality meat products of sound slaughtered animals should be pre-packaged. Packaging and sealing should take place immediately after dissection, and with strict regard to sanitary and hygienic conditions. The temperature in the packaging rooms should not exceed 10°C., and air humidity 70%. The bacterial count should be low. The smaller the pieces of meat, the shorter will be the keeping time. After wrapping, the packages should be kept in cold storage at all stages of transport and at the retail shop. Storage temperature is of utmost influence on the keeping quality of pre-packaged products. Exposure to light should be avoided as it tends to increase the bacterial count. Anærobic conditions as they usually prevail in vacuum-packed goods do not prevent the growth of bacteria as those encountered are mostly of the facultatively anærobic type. The storage period of pre-packed meat products in retail shops should be as short as possible.—L. Leistner, *Die Fleischwirtschaft*, 1956, **8**, 422.

TOMATO PURÉE

Effects of Heat Treatment

Research has been carried out at the Pan-Soviet Food Preserve Research Institute, Moscow, on the effect of heat treatment on the sugar, nitrogen and carotenoid contents of tomato purée. For this purpose tomato purée was heated to *ca.* 100°C., partly in open air and partly in an atmosphere of inert gas, containing no

oxygen. The loss in sugar contents increased with the duration of the heating period, while there was little change in acidity. The loss in sugar contents also increased with the concentration of the purée. High-temperature treatment also entailed considerable losses in nitrogenous substances. Most of the losses in amino-acids occurred during the first 30 min. of heating. The presence or absence of oxygen had no bearing on these losses. Heat treatment also destroyed certain carotenoid pigments characteristic for ripe tomatoes so that there was a change of colour and a deterioration of quality.—W. S. Crziwo, quoted in *La Revue de la Conserve*, 1956, **11**, 35.

FISH

Salmon Substitutes

The basic procedure for the preparation of seelachs (salmon substitutes) from coalfish or other gadoid fish is as follows: the fish are washed, filleted and salted with enough salt to form a pickle and the pickle is allowed to run off. The fish can also be salted in casks. After salting, the fillets are cut into pieces of required size and put into the dyeing bath, which contains 100 l. (26·4 gal.) water, 6 to 12 kg. (13·2 to 26·4 lb.) of salt, 1 l. (0·26 gal.) of 10% acetic acid, 35 to 50 g. (1¼ to 1¾ oz.) of dyestuff and 200 to 300 g. (7⅛ to 10⅝ oz.) of preservative. The fish slices are dipped in the dyeing bath for a period of 5 to 10 min. After draining, the pieces are smoked and canned in oil.

The raw material is generally coalfish, but pollack, cod and other gadoid fishes can be used. Absolutely fresh fish should be used. Fish caught off Iceland from October to April are good. Some fish caught in March undergo a change known as "speck-fish" (fatty fish) when they are made into seelachs.

Salting of the fresh fillets is done in the proportion of 5 parts of fish to 1 part of salt or preferably 2 parts of fish to 1 part of salt and in summer 1 part of fish to 1 part of salt. The mixture is allowed to stand for 48 to 56 hr. Then the fish are piled in layers with salt and sprinkled with 24% brine. The fish can be stored for 3 to 4 weeks in a cold room. The salt used should be free from red halophilic bacteria. After this, the fillets can be cut into slices of desired size in machines or by hand.

The object of dipping the slices of fish in the dyeing bath is to (1) give a colour to them; (2) to reduce their salt content to 8 to 10%; (3) to reduce the water content to 70%; (4) to incorporate the preservative and reduce the *p*H to optimum levels to ensure good keeping quality; (5) to improve the taste. The following dyestuff can be used. Tartrazine Yellow (A2), Amaranth (47), Cochineal Red (A8), Scarlet GN (A11), Yellow Orange S (A18). The dyeing bath should be renewed frequently as the concentration of the acid and preservative decreases and the protein concentration of the bath increases, thereby favouring growth of bacteria. After dyeing, the slices of fish are allowed to drain before smoking.

Smoking in natural freshly obtained smoke is preferable to using the so-called smoke essences. Smoking should be done for 10 to 20 min. in saturated smoke at a temperature of 18° to 20°C. (64·4° to 68°F.) raising to a maximum of 25°C. (77°F.). A good smoking enhances keeping quality.

Preservatives used are benzoic acid, hexamine or salicylic acid. The fish slices are packed in lacquered tin cans, though plastic containers can be used. Oil is put into the cans so that there is no headspace, and the amount of oil used should be at least 15%, but not more than 20%, of the can also be used in oil solution.

The risk of spoilage of seelachs and eventual poisoning by pathogenic bacteria such as *Clostridium botulinum* is not great. Though the spores of *Clostridium botulinum* are very resistant, the toxin produced by the bacteria is thermolabile and is inactivated in 15 to 30 min. at 80°C. (176°F.).—FAO World Fisheries Abstracts, 1956, **1**, 3, 41.

Smoke-curing Salmon and Trout in the Torry Controlled Kiln

(*From p.* 435)

Storage properties

Dry-salted salmon, cured as recommended above, could be kept for a week to ten days at ordinary temperatures of 55°F.-60°F. before moulds or unpleasant "off" flavours developed, and for about three weeks at 32°F. The brine-pickled salmon, which on balance had lost less water during the process than the dry-salted fish, kept a few days less well in each case.

The work described in this paper was carried out as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research. (Crown Copyright Reserved.)

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Machinery and Equipment

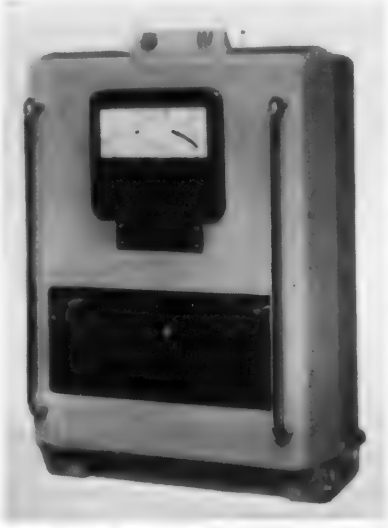
NUCLEONIC LEVEL INDICATOR

A new nucleonic level indicator, made by Baldwin Instruments Co. Ltd., comprises a gamma emitting isotope placed on one side of a container and a detector on the other. Radiation passes from the isotope, through the container to the detector which is in fact a geiger counter. The output from the detector is proportional to the amount of radiation which it receives. Thus when the contents of a container are below the radioactive "beam," maximum radiation will be received by the detector. When the contents rise and cut the "beam," the radiation reaching the detector will be substantially smaller. The difference in radiation reaching the detector is shown as a difference in electrical output from the geiger counter, and this is arranged to operate a relay. The indicator unit shown in the photograph houses the relay and two lamps which indicate whether the "beam" is broken or not. It is a relatively simple matter to incorporate the relay in some automatic control circuit.

For complete control, two heads can be fitted to the container, thereby giving indication when the contents reach both maximum and minimum levels. Alternatively, a moveable head can be fitted so that the "level" can be determined at any given time.

As the operation of the relay is dependent in the first instance on the *difference* in radiation, it is possible to detect the boundary between, say, two liquids having substantially different densities. This is simply because the lower the density, the greater will be the amount of radiation which will pass through.

Both the isotope and the detector are simply fixed to the outside of the container. The equipment in the detector and the indicator unit are housed in robust dust-proof metal cases, and are fitted on anti-vibration mountings.



New level indicator using gamma-emitting isotope and detector fitted to outside of container.

DOUBLE-OVEN UNIT

A new double-oven unit, made by Essard Ltd. is completely refractory-brick lined for solid heat. Air ducts circulate hot air throughout the oven chamber and, together with its heavily insulated walls, conserves the heat inside the baking chamber, giving low fuel consumption.

Each oven is individually fired, and thermostatically controlled, and has a visible-reading thermometer. The high efficiency burner assembly is made up of burner bars, with patented and officially approved jets, and the whole system of thermostat, relay valve, flame failure control valve and mains pressure governor are all of approved pattern and to B.S.S. The addition of the flame failure control valve (a standard practice on all Essard baking ovens) makes for safety in operation.

Also fitted is an intermediate withdrawable shelf between each deck. These are intended for use for extra batches of smalls, but should be withdrawn when normal baking is in progress. Deck size is 30 in. deep × 36 in. wide—each deck thus taking 2 trays each 30 in. × 18 in. When using the intermediate tiers, 8 trays in all can be used.

The chief advantages of the individually fired double-oven unit are that goods at varying temperatures can be cooked at one and the same time; or, when required, one deck only may be used thus conserving the cost of fuel. Patent burners, press-button pilot ignition and flame failure control valve, thermostat, visible-reading thermometer, together with one complete set of baking trays, are all part of the standard equipment and do not involve extra cost. External finish is in vitreous enamel.

With this new individual-fired double-oven unit goods can be cooked at varying temperatures at one and the same time.

GAS WATER HEATERS

The 503 range of Ascot gas water heaters, which has been evolved to suit a whole range of requirements, consists of the following seven types:

503/0. Inlet controlled single-point sink gas water heater incorporating an annular type heating body, single hot water tap and outlet spout. A gas control cock is required to be fitted externally in the gas line near the heater.

503/1. As type /0, but incorporating both hot and cold water taps.

503/2. Inlet controlled single-point sink gas water heater incorporating an annular type heating body, built in gas control cock, single hot water tap and outlet spout.

503/3. As type /2, but incorporating both hot and cold water taps.

503/4. Small multipoint gas water heater incorporating pressure proof coil type heating body, built in gas control and multipoint connection. This heater is not fitted with any water taps.

503/5. As type /4, but incorporating a single hot water tap and outlet spout.

503/6. As type /5, but incorporating both hot and cold water taps.

Heaters type /0, to /3 are designed to provide a single point hot water supply to the kitchen sink for household purposes or for toilet use at a cloakroom basin, the hot water supply, up to a temperature of approximately 150°F. being delivered through a swivel spout which may be used to

supply two adjacent fittings. These heaters are inlet controlled, and must not, therefore, be connected to any restriction in the form of taps, valves, piping or fittings. Types /4 to /6 are designed to provide a limited multipoint hot water supply to two sinks or basins or a shower or hip bath, but types /5 and /6 can be used in the same manner as types /0 to /3, since they are fitted with a swivel spout in addition to the multipoint connection.

An automatic valve prevents gas passing to the burner unless a predetermined minimum quantity of water is flowing through the heater. The minimum or operating flow is accurately set on the factory test stand so that on the district its position cannot be altered. The rubber diaphragm is reinforced giving long life, while the venturi is fitted with an "O" ring seal, ensuring positive sealing and continuous efficient operation of the venturi.

On show for the first time this month at the Vochema exhibition in Holland, is this ultra high temperature milk treatment plant for the pre-bottle sterilisation of milk at 135° C.

MILK PLANT

Among exhibits at the Vochema exhibition at Utrecht (Holland) this month will be some representative examples of the wide range of milk processing and handling equipment manufactured by the A.P.V. Co. Ltd. in stainless steel. These will include:

(1) The Paraflow short-time pasteurisation plant (type HMBT-P). A completely automatic type of milk pasteurisation plant. The plant exhibited is of 7,000 litres per hour capacity and embodies a control panel that contains the holding tube, flow diversion valve and all instruments and controls. The type HMBT *Paraflow* allows pressure up to 7 kg. per. sq. centimetre.

(2) The *Paraflow* ultra high temperature milk treatment plant (type HMBT) for the pre-bottle sterilisation of milk at temperatures around 135°C., exhibited in Holland for the first time. The heating is achieved in a type HMBT *Paraflow*, which is of the high pressure type and has a capacity of 4,400 litres per hour. Accompanying this plant is an APV Manton-Gaulin homogeniser, as homogenisation is an essential part of the process.

Also on show are examples of the APV range of *Paraflow* plate heat exchangers, stainless steel pipe fittings, stainless steel pumps (for milk, beer and other potable liquids) and the company's continuous beer pasteuriser and yeast culture plant.

MARKING UNITS

A friction-operated marking machine has been introduced by the Sauven Perforating Machine Co., under the trade name *Codapak*. It is intended for imprinting code-dates, batch numbers, or other information, on the tops, bottoms or sides of packages moving past it on a conveyor. It is provided with simple means of attachment to the side-frame of the conveyor, or to any sealing or packaging machine in a production line. Since it operates by friction, no independent source of power is needed.

The type, which may represent either figures or letters, is made of wear-resistant rubber. It is inked afresh after every operation by a self-inking roller containing the ink reservoir. This needs refilling periodically; possibly once a day. Apart from this maintenance task, the machine is entirely automatic in operation.

The roller on which the type is mounted is made to rotate by frictional contact with a package. When contact ceases, the type is reset to its original position by a spring, and each package is marked, therefore, in a constant predetermined position. In cases where no space is left between the packages, the spring can be removed from the roller, which then rotates continuously and imprints a random mark on each package.

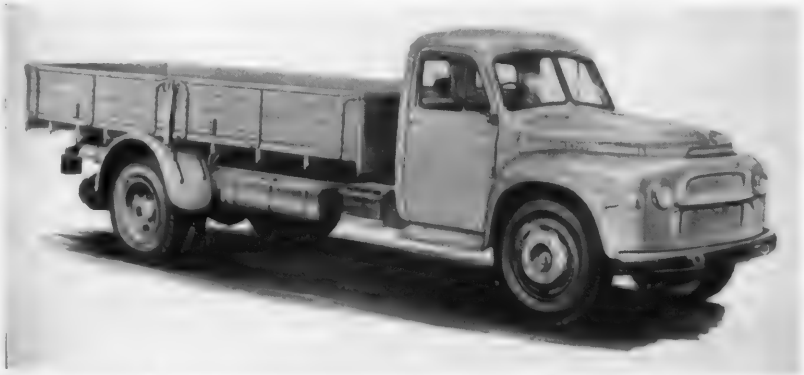
Several versions of this unit are available to suit different sizes of cartons and to print in large or small characters.

The company have also introduced a simple and versatile marking system under the name *Baselock*, for printing data on labels, tickets, cartons, sacks, drums and other surfaces.

NEW TRUCKS

Many outstanding features distinguish the new series of trucks announced by Dodge Brothers (Britain) Ltd. Readily apparent is the advanced styling of the full bonneted front-end and the three-seater driver's cab. With nominal payload ratings ranging from 2 to 7 tons, petrol or diesel power units, and short or long wheelbase lengths, the new models are suitable for a wide variety of hauling assignments.

The driver's cab has a generously equipped interior. All instruments are neatly grouped and within easy eye range. Built-in ventilating system ensures constant fresh air, at atmospheric temperature, without draughts. An unusually large glass area to the front, sides and rear of the cab provides the driver with all-round vision. Provision is made for fitting heater and windscreen de-misters. Wide seats ensure ample hip room and shoulder room for three full-size men.



These new-style three-seater Dodge trucks have nominal payload ratings from 2 to 7 tons. Power units can be either petrol or diesel.

News Digest

Non-subsidised bread—a shilling a loaf?

New prices for the standard 1½ lb. loaf following the withdrawal of the bread subsidy—which ended on September 30—may vary from 10d. for the plant baked loaf to 11½d. or even 1s. for first quality hand-made bread. The highest price suggested so far has been 1s. 3d. for a high quality loaf in Yorkshire.

Considerable discussions on the price of bread took place during the weeks preceding the withdrawal of the subsidy. Different bakers' associations have made their own price recommendations to members so there will be no national price. The Federation of Wholesale and Multiple Bakers have recommended members to charge 10d. for the loaf in "port" and "sub-port" areas and 10½d. elsewhere. On September 17 at a meeting in Harrogate the council of the National Association of Master Bakers—representing 43·5% of bread production in Britain—stated that many family bakers would be forced out of business if the "1½ lb. quality loaf" was sold by them for less than 11d. in those areas such as London where the price of flour is at its lowest. They added that the price might be higher in the provinces. This recommendation was repeated by Mr. E. F. Mitchell, chairman of the Association's parliamentary committee, at a press conference in London on September 25. "It will be essential in the case of family bakers for the increase in the price of bread to be a little more than the amount represented by the subsidy," he said, though he emphasised that the Association did not fix prices.

New Flour.—The National Association of British and Irish Millers have announced that four main new types of flour will be available from October 1:

"First, a new white bread flour, similar in quality to pre-war, and enriched with the prescribed nutrients. This will be the basic grade.

"Second, a superfine white bread flour, also enriched and selling at a premium above the basic grade.

"Third, a softer type of white bread flour selling at a discount below the basic grade. This is a flour which some bakers may require for special purposes and for mixing in with stronger bread flours.

"Fourth, a high extraction "off-white" flour, deriving its nutrients solely from the milling process.

On the subject of price the announcement stated:

"In the absence of any wide fluctuations, the group associations expect that the price of 'National' flour will not rise above its present level between now and the ending of the bread subsidy." (The price of "National" flour is at present quoted at 102s. a sack of 280 lb. delivered in central London or in the main port areas.)

Ministry stages a Dehydration Exhibition

Members of the Food Manufacturers' Federation and Food Machinery Association were among those who visited the recent Dehydration Exhibition at the Ministry of Agriculture, Fisheries and Food, London. The Exhibition, which was taken from part of the United Kingdom "Advance with Britain" stand at the Canadian National Exhibition in Toronto, was designed to show scientific and technical developments in methods of drying food made at the Ministry of Agriculture, Fisheries and Food Experimental Factory at Aberdeen.

The main display of photographs in the exhibition gave a brief history of the drying of foods, beginning with fish and geese being prepared for drying in the sun in Egypt nearly 3,000 years ago. This led up to the modern developments at the Aberdeen factory, where meat and fish are dried by methods which include the vacuum contact plate method. Carrots, potatoes and cabbage, and many kinds of fruit can also be dried by this method or by other forms of air drying.

The 5-oz. meat bar aroused much interest. Made of equal parts of precooked beef and pork mince, it can be reconstituted to give the equivalent of 15 oz. of cooked fresh mince. In an emergency the bar can be opened and eaten like a bar of chocolate. The meat bar has been very favourably praised by leaders of recent mountaineering and Antarctic expeditions who have tried it out. It is also now being used as a part of survival rations by one of the Forces.

The visitors were shown round the exhibition by Dr. H. R. Barnell, deputy chief scientific adviser to the Ministry and Mr. G. N. Lawrence, liaison officer for Food Development and Dehydration.

Left to Right: **Mr. G. W. Riley and Mr. C. J. Grayston of George Scott & Son (London), Ltd., study photographs showing fish being dehydrated by the vacuum contact plate method explained to them by Dr. H. R. Barnell, deputy chief scientific advisor, Ministry of Agriculture, Fisheries and Food at the Dehydration Exhibition.**

News for Importers

Canned fruits.—Separate quotas have been arranged for further imports of canned fruits from Canada and the U.S., to be purchased with dollars made available under the Mutual Security Act, 1954. (*See* FOOD MANUFACTURE, December, 1955, *p.* 518.) The varieties of canned fruits which may be imported from either country will be: apricots, cherries, figs, peaches, pears, cranberries, fruit salad and fruit cocktail. Licences will be valid until April 30, 1957. Details are given by the Board of Trade in Notice to Importers No. 791.

Bacon, ham and pork.—In Notice to Importers No. 792, details are given of the arrangements for the import of bacon, ham and pork (including imports from the Irish Republic). Imports of bacon will be admitted without limitation as to quantity under open individual licences (valid initially for six months) from the sterling area and the "relaxation" countries (chiefly O.E.E.C. countries and their dependencies). Arrangements will also be made for the import of bacon from Poland and Hungary under the bilateral trade arrangements with those countries.

Imports of whole hams will be admitted from the sterling area under open individual licences.

Imports of fresh, chilled and frozen pork will continue to be admitted without restriction as to quantity from the sterling area under open individual licences. Imports of pork of these types from the "relaxation" countries, at present subject to a quota, will be admitted under open individual licences from October 1.

Licences in all cases will be valid until March 31, 1957.

Fresh pears from N. America.—The Board of Trade announce that arrangements have been made for the import from the U.S. of a further quota of fresh pears to the value of £335,000 f.o.b. to be purchased with dollars made available under the U.S. Mutual Security Act, 1954. The fruit will not be eligible for any U.S. export subsidy. Licences will also be issued for further imports of fresh pears from Canada to the value of £20,000 f.o.b. Details are given in Notice to Importers No. 794.

Canned Pigmeat.—Notice to Importers No. 795 gives details of the import of canned pigmeat and certain pigmeat products. The new Notice amends the Open General Licence to admit the import of canned pigmeat and certain pigmeat products from the Sterling Area and the "relaxation" countries (chiefly O.E.E.C. countries and their dependencies).

These arrangements follow the reversion of imports of bacon from Government account to private trade with effect from October 1, 1956.

OBITER DICTA

● Leslie Hurry's settings are as coarse as his costumes, a dissonance of sequins, Pepsi-Cola purple and desiccated mud.—*Theatre critic in The Observer.*

● More than 160 million Australian eggs are coming to Britain this season. They "sleep" through the voyage and arrive fresh.—*Publicity handout.*

● American striptease star, Lili St. Cyr, stood screaming, drenched with chicken soup, as two men battled in a Las Vegas casino grill-room today.—*Daily Express.*

● When confronted with a particularly choice dish at a banquet, his countenance should change and he should rise to his feet.—*Confucius on the proper behaviour of a guest.*

● In France the presentation of dragees to relatives and close friends takes the place of the old English custom of "wetting the baby's head."—*Manesty News Letter.*

● A self-service supermarket in Milan has gone out of business because housewives complained: "There are no shop assistants to argue with about the quality of the goods."—*Sunday Dispatch.*

● Meals will cost passengers only $4 a day, but if anyone pays merely the $50 fare and brings his own salami, he'll be just as welcome.—*Mr. H. B. Cantor, American hotel owner, who plans cheap Atlantic travel on super liners.*

● The somewhat gruesome suggestion was made by a consumer of marmalade supplied to a school that an object found in it was part of a finger nail. We drew a breath of relief when we discovered it was merely a portion of a pip.—*Birmingham City Analyst.*

● On the atomic submarine, French fried potatoes—one of the crew's favourite dishes—is rarely on the menu because frying, it has been found, produces a toxic gas which it is difficult to neutralise without outside ventilation.—*Daily Express.*

● For over two years I have had a Penguin every afternoon with my cup of tea at the office . . . I also eat them at weekends. I reckon I must have eaten a thousand during the last two years.—*Non-solicited testimonial from Twigworth housewife.*

January 1, sugar surcharge day

The Minister of Agriculture, Fisheries and Food has decided to appoint January 1, 1957, as the day on which the Sugar Board will begin to discharge their functions and on which the surcharge on sugar will come into effect in accordance with the Sugar Act, 1956.

An Order giving statutory effect to this decision will be made in due course.

The Sugar Board's main functions will be:

(*a*) to buy Commonwealth sugar in accordance with the Government's contractual obligations under the Commonwealth Sugar Agreement and to sell such sugar to private traders at commercial prices;

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The Board of Trade announce that under new regulations which come into effect on January 27, 1957, bacon and ham will not, as hitherto, be required to be pre-packed in certain fixed quantities only. Both foods, however, are still required to be sold by net weight (or by gross weight if the weight of the wrapper or container in which they are weighed for sale does not exceed certain prescribed amounts). The Regulations also provide for the giving of a statement of net weight (or of gross weight, as the case may be) with any delivery of bacon and ham (other than pre-packed bacon and ham) which is not weighed in the presence of the purchaser and delivered to him forthwith. The wrappers or containers of pre-packed bacon and ham are required to be marked with a statement of net weight or of gross weight.

Copies of the regulations, Sale of Food (Weights and Measures: Bacon and Ham) Regulations, 1956. (S.I. 1956 No. 1165) can be obtained from H.M.S.O., price 3d. (by post, 5d.).

Machinery and Equipment

NUCLEONIC LEVEL INDICATOR

A new nucleonic level indicator, made by Baldwin Instruments Co. Ltd., comprises a gamma emitting isotope placed on one side of a container and a detector on the other. Radiation passes from the isotope, through the container to the detector which is in fact a geiger counter. The output from the detector is proportional to the amount of radiation which it receives. Thus when the contents of a container are below the radioactive "beam," maximum radiation will be received by the detector. When the contents rise and cut the "beam," the radiation reaching the detector will be substantially smaller. The difference in radiation reaching the detector is shown as a difference in electrical output from the geiger counter, and this is arranged to operate a relay. The indicator unit shown in the photograph houses the relay and two lamps which indicate whether the "beam" is broken or not. It is a relatively simple matter to incorporate the relay in some automatic control circuit.

For complete control, two heads can be fitted to the container, thereby giving indication when the contents reach both maximum and minimum levels. Alternatively, a moveable head can be fitted so that the "level" can be determined at any given time.

As the operation of the relay is dependent in the first instance on the *difference* in radiation, it is possible to detect the boundary between, say, two liquids having substantially different densities. This is simply because the lower the density, the greater will be the amount of radiation which will pass through.

Both the isotope and the detector are simply fixed to the outside of the container. The equipment in the detector and the indicator unit are housed in robust dust-proof metal cases, and are fitted on anti-vibration mountings.

New level indicator using gamma-emitting isotope and detector fitted to outside of container.

DOUBLE-OVEN UNIT

A new double-oven unit, made by Essard Ltd. is completely refractory-brick lined for solid heat. Air ducts circulate hot air throughout the oven chamber and, together with its heavily insulated walls, conserves the heat inside the baking chamber, giving low fuel consumption.

Each oven is individually fired, and thermostatically controlled, and has a visible-reading thermometer. The high efficiency burner assembly is made up of burner bars, with patented and officially approved jets, and the whole system of thermostat, relay valve, flame failure control valve and mains pressure governor are all of approved pattern and to B.S.S. The addition of the flame failure control valve (a standard practice on all Essard baking ovens) makes for safety in operation.

Also fitted is an intermediate withdrawable shelf between each deck. These are intended for use for extra batches of smalls, but should be withdrawn when normal baking is in progress. Deck size is 30 in. deep × 36 in. wide—each deck thus taking 2 trays each 30 in. × 18 in. When using the intermediate tiers, 8 trays in all can be used.

The chief advantages of the individually fired double-oven unit are that goods at varying temperatures can be cooked at one and the same time; or, when required, one deck only may be used thus conserving the cost of fuel. Patent burners, press-button pilot ignition and flame failure control valve, thermostat, visible-reading thermometer, together with one complete set of baking trays, are all part of the standard equipment and do not involve extra cost. External finish is in vitreous enamel.

With this new individual-fired double-oven unit goods can be cooked at varying temperatures at one and the same time.

GAS WATER HEATERS

The 503 range of Ascot gas water heaters, which has been evolved to suit a whole range of requirements, consists of the following seven types:

503/0. Inlet controlled single-point sink gas water heater incorporating an annular type heating body, single hot water tap and outlet spout. A gas control cock is required to be fitted externally in the gas line near the heater.

503/1. As type /0, but incorporating both hot and cold water taps.

503/2. Inlet controlled single-point sink gas water heater incorporating an annular type heating body, built in gas control cock, single hot water tap and outlet spout.

503/3. As type /2, but incorporating both hot and cold water taps.

503/4. Small multipoint gas water heater incorporating pressure proof coil type heating body, built in gas control and multipoint connection. This heater is not fitted with any water taps.

503/5. As type /4, but incorporating a single hot water tap and outlet spout.

503/6. As type /5, but incorporating both hot and cold water taps.

Heaters type /0, to /3 are designed to provide a single point hot water supply to the kitchen sink for household purposes or for toilet use at a cloakroom basin, the hot water supply, up to a temperature of approximately 150°F. being delivered through a swivel spout which may be used to

supply two adjacent fittings. These heaters are inlet controlled, and must not, therefore, be connected to any restriction in the form of taps, valves, piping or fittings. Types /4 to /6 are designed to provide a limited multipoint hot water supply to two sinks or basins or a shower or hip bath, but types /5 and /6 can be used in the same manner as types /0 to /3, since they are fitted with a swivel spout in addition to the multipoint connection.

An automatic valve prevents gas passing to the burner unless a predetermined minimum quantity of water is flowing through the heater. The minimum or operating flow is accurately set on the factory test stand so that on the district its position cannot be altered. The rubber diaphragm is reinforced giving long life, while the venturi is fitted with an "O" ring seal, ensuring positive sealing and continuous efficient operation of the venturi.

On show for the first time this month at the Vochema exhibition in Holland, is this ultra high temperature milk treatment plant for the pre-bottle sterilisation of milk at 135 C.

MILK PLANT

Among exhibits at the Vochema exhibition at Utrecht (Holland) this month will be some representative examples of the wide range of milk processing and handling equipment manufactured by the A.P.V. Co. Ltd. in stainless steel. These will include:

(1) The Paraflow short-time pasteurisation plant (type HMBT-P). A completely automatic type of milk pasteurisation plant. The plant exhibited is of 7,000 litres per hour capacity and embodies a control panel that contains the holding tube, flow diversion valve and all instruments and controls. The type HMBT *Paraflow* allows pressure up to 7 kg. per. sq. centimetre.

(2) The *Paraflow* ultra high temperature milk treatment plant (type HMBT) for the pre-bottle sterilisation of milk at temperatures around 135°C., exhibited in Holland for the first time. The heating is achieved in a type HMBT *Paraflow*, which is of the high pressure type and has a capacity of 4,400 litres per hour. Accompanying this plant is an APV Manton-Gaulin homogeniser, as homogenisation is an essential part of the process.

Also on show are examples of the APV range of *Paraflow* plate heat exchangers, stainless steel pipe fittings, stainless steel pumps (for milk, beer and other potable liquids) and the company's continuous beer pasteuriser and yeast culture plant.

MARKING UNITS

A friction-operated marking machine has been introduced by the Sauven Perforating Machine Co., under the trade name *Codapak*. It is intended for imprinting code-dates, batch numbers, or other information, on the tops, bottoms or sides of packages moving past it on a conveyor. It is provided with simple means of attachment to the side-frame of the conveyor, or to any sealing or packaging machine in a production line. Since it operates by friction, no independent source of power is needed.

The type, which may represent either figures or letters, is made of wear-resistant rubber. It is inked afresh after every operation by a self-inking roller containing the ink reservoir. This needs refilling periodically; possibly once a day. Apart from this maintenance task, the machine is entirely automatic in operation.

The roller on which the type is mounted is made to rotate by frictional contact with a package. When contact ceases, the type is reset to its original position by a spring, and each package is marked, therefore, in a constant predetermined position. In cases where no space is left between the packages, the spring can be removed from the roller, which then rotates continuously and imprints a random mark on each package.

Several versions of this unit are available to suit different sizes of cartons and to print in large or small characters.

The company have also introduced a simple and versatile marking system under the name *Baselock*, for printing data on labels, tickets, cartons, sacks, drums and other surfaces.

NEW TRUCKS

Many outstanding features distinguish the new series of trucks announced by Dodge Brothers (Britain) Ltd. Readily apparent is the advanced styling of the full bonneted front-end and the three-seater driver's cab. With nominal payload ratings ranging from 2 to 7 tons, petrol or diesel power units, and short or long wheelbase lengths, the new models are suitable for a wide variety of hauling assignments.

The driver's cab has a generously equipped interior. All instruments are neatly grouped and within easy eye range. Built-in ventilating system ensures constant fresh air, at atmospheric temperature, without draughts. An unusually large glass area to the front, sides and rear of the cab provides the driver with all-round vision. Provision is made for fitting heater and windscreen de-misters. Wide seats ensure ample hip room and shoulder room for three full-size men.

These new-style three-seater Dodge trucks have nominal payload ratings from 2 to 7 tons. Power units can be either petrol or diesel.

News Digest

Non-subsidised bread—a shilling a loaf?

New prices for the standard 1¾ lb. loaf following the withdrawal of the bread subsidy—which ended on September 30—may vary from 10d. for the plant baked loaf to 11½d. or even 1s. for first quality hand-made bread. The highest price suggested so far has been 1s. 3d. for a high quality loaf in Yorkshire.

Considerable discussions on the price of bread took place during the weeks preceding the withdrawal of the subsidy. Different bakers' associations have made their own price recommendations to members so there will be no national price. The Federation of Wholesale and Multiple Bakers have recommended members to charge 10d. for the loaf in "port" and "subport" areas and 10½d. elsewhere. On September 17 at a meeting in Harrogate the council of the National Association of Master Bakers—representing 43·5% of bread production in Britain—stated that many family bakers would be forced out of business if the "1¾ lb. quality loaf" was sold by them for less than 11d. in those areas such as London where the price of flour is at its lowest. They added that the price might be higher in the provinces. This recommendation was repeated by Mr. E. F. Mitchell, chairman of the Association's parliamentary committee, at a press conference in London on September 25. "It will be essential in the case of family bakers for the increase in the price of bread to be a little more than the amount represented by the subsidy," he said, though he emphasised that the Association did not fix prices.

New Flour.—The National Association of British and Irish Millers have announced that four main new types of flour will be available from October 1:

"First, a new white bread flour, similar in quality to pre-war, and enriched with the prescribed nutrients. This will be the basic grade.

"Second, a superfine white bread flour, also enriched and selling at a premium above the basic grade.

"Third, a softer type of white bread flour selling at a discount below the basic grade. This is a flour which some bakers may require for special purposes and for mixing in with stronger bread flours.

"Fourth, a high extraction "off-white" flour, deriving its nutrients solely from the milling process.

On the subject of price the announcement stated:

"In the absence of any wide fluctuations, the group associations expect that the price of 'National' flour will not rise above its present level between now and the ending of the bread subsidy." (The price of "National" flour is at present quoted at 102s. a sack of 280 lb. delivered in central London or in the main port areas.)

Ministry stages a Dehydration Exhibition

Members of the Food Manufacturers' Federation and Food Machinery Association were among those who visited the recent Dehydration Exhibition at the Ministry of Agriculture, Fisheries and Food, London. The Exhibition, which was taken from part of the United Kingdom "Advance with Britain" stand at the Canadian National Exhibition in Toronto, was designed to show scientific and technical developments in methods of drying food made at the Ministry of Agriculture, Fisheries and Food Experimental Factory at Aberdeen.

The main display of photographs in the exhibition gave a brief history of the drying of foods, beginning with fish and geese being prepared for drying in the sun in Egypt nearly 3,000 years ago. This led up to the modern developments at the Aberdeen factory, where meat and fish are dried by methods which include the vacuum contact plate method. Carrots, potatoes and cabbage, and many kinds of fruit can also be dried by this method or by other forms of air drying.

The 5-oz. meat bar aroused much interest. Made of equal parts of precooked beef and pork mince, it can be reconstituted to give the equivalent of 15 oz. of cooked fresh mince. In an emergency the bar can be opened and eaten like a bar of chocolate. The meat bar has been very favourably praised by leaders of recent mountaineering and Antarctic expeditions who have tried it out. It is also now being used as a part of survival rations by one of the Forces.

The visitors were shown round the exhibition by Dr. H. R. Barnell, deputy chief scientific adviser to the Ministry and Mr. G. N. Lawrence, liaison officer for Food Development and Dehydration.

Left to Right: **Mr. G. W. Riley and Mr. C. J. Grayston of George Scott & Son (London), Ltd., study photographs showing fish being dehydrated by the vacuum contact plate method explained to them by Dr. H. R. Barnell, deputy chief scientific advisor, Ministry of Agriculture, Fisheries and Food at the Dehydration Exhibition.**

News for Importers

Canned fruits.—Separate quotas have been arranged for further imports of canned fruits from Canada and the U.S., to be purchased with dollars made available under the Mutual Security Act, 1954. (*See* FOOD MANUFACTURE, December, 1955, *p.* 518.) The varieties of canned fruits which may be imported from either country will be: apricots, cherries, figs, peaches, pears, cranberries, fruit salad and fruit cocktail. Licences will be valid until April 30, 1957. Details are given by the Board of Trade in Notice to Importers No. 791.

Bacon, ham and pork.—In Notice to Importers No. 792, details are given of the arrangements for the import of bacon, ham and pork (including imports from the Irish Republic). Imports of bacon will be admitted without limitation as to quantity under open individual licences (valid initially for six months) from the sterling area and the "relaxation" countries (chiefly O.E.E.C. countries and their dependencies). Arrangements will also be made for the import of bacon from Poland and Hungary under the bilateral trade arrangements with those countries.

Imports of whole hams will be admitted from the sterling area under open individual licences.

Imports of fresh, chilled and frozen pork will continue to be admitted without restriction as to quantity from the sterling area under open individual licences. Imports of pork of these types from the "relaxation" countries, at present subject to a quota, will be admitted under open individual licences from October 1.

Licences in all cases will be valid until March 31, 1957.

Fresh pears from N. America.—The Board of Trade announce that arrangements have been made for the import from the U.S. of a further quota of fresh pears to the value of £335,000 f.o.b. to be purchased with dollars made available under the U.S. Mutual Security Act, 1954. The fruit will not be eligible for any U.S. export subsidy. Licences will also be issued for further imports of fresh pears from Canada to the value of £20,000 f.o.b. Details are given in Notice to Importers No. 794.

Canned Pigmeat.—Notice to Importers No. 795 gives details of the import of canned pigmeat and certain pigmeat products. The new Notice amends the Open General Licence to admit the import of canned pigmeat and certain pigmeat products from the Sterling Area and the "relaxation" countries (chiefly O.E.E.C. countries and their dependencies).

These arrangements follow the reversion of imports of bacon from Government account to private trade with effect from October 1, 1956.

OBITER DICTA

● Leslie Hurry's settings are as coarse as his costumes, a dissonance of sequins, Pepsi-Cola purple and desiccated mud.—*Theatre critic in The Observer.*

● More than 160 million Australian eggs are coming to Britain this season. They "sleep" through the voyage and arrive fresh.—*Publicity handout.*

● American striptease star, Lili St. Cyr, stood screaming, drenched with chicken soup, as two men battled in a Las Vegas casino grill-room today.—*Daily Express.*

● When confronted with a particularly choice dish at a banquet, his countenance should change and he should rise to his feet.—*Confucius on the proper behaviour of a guest.*

● In France the presentation of dragees to relatives and close friends takes the place of the old English custom of "wetting the baby's head."—*Manesty News Letter.*

● A self-service supermarket in Milan has gone out of business because housewives complained: "There are no shop assistants to argue with about the quality of the goods."—*Sunday Dispatch.*

● Meals will cost passengers only $4 a day, but if anyone pays merely the $50 fare and brings his own salami, he'll be just as welcome.—*Mr. H. B. Cantor, American hotel owner, who plans cheap Atlantic travel on super liners.*

● The somewhat gruesome suggestion was made by a consumer of marmalade supplied to a school that an object found in it was part of a finger nail. We drew a breath of relief when we discovered it was merely a portion of a pip.—*Birmingham City Analyst.*

● On the atomic submarine, French fried potatoes—one of the crew's favourite dishes—is rarely on the menu because frying, it has been found, produces a toxic gas which it is difficult to neutralise without outside ventilation.—*Daily Express.*

● For over two years I have had a Penguin every afternoon with my cup of tea at the office . . . I also eat them at weekends. I reckon I must have eaten a thousand during the last two years.—*Non-solicited testimonial from Twigworth housewife.*

January 1, sugar surcharge day

The Minister of Agriculture, Fisheries and Food has decided to appoint January 1, 1957, as the day on which the Sugar Board will begin to discharge their functions and on which the surcharge on sugar will come into effect in accordance with the Sugar Act, 1956.

An Order giving statutory effect to this decision will be made in due course.

The Sugar Board's main functions will be:

(*a*) to buy Commonwealth sugar in accordance with the Government's contractual obligations under the Commonwealth Sugar Agreement and to sell such sugar to private traders at commercial prices;

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Company Profits and Prospects

Poor year for chocolate

In spite of the competitive conditions ruling in 1955, Associated Chocolate Manufacturers had a not wholly unfavourable year. The drop in prices of two of the company's chief raw materials, cocoa beans and cocoa butter, created abnormal conditions. Beans fell from the 1954 peak of 560s. per cwt. to 260s. at the end of 1955 and it was necessary to write down stocks to market level. This was provided for by reserves already set up.

Group trading profit amounted to £343,078 compared with £808,339 in the previous year but net profit after tax was £269,435 (£394,833), plus tax adjustments of £2,929 (£4,037). The 12½% dividend on £624,000 Ordinary equals the 25% on the old capital.

Sales this year are above expectations.

▪

Intense competition affects canning profits

A reduction in net profit of approximately £50,000 is reported by United Canners Ltd. for 1955 following a year of intense competition in the industry. At the company's recent annual meeting, the chairman, Mr. R. C. Scott, said that the competition had arisen mostly from small canners who had not the selling organisation to deal with the prevailing difficult marketing conditions and who had accordingly accepted uneconomic prices in order to dispose of their pack. United Canners had nevertheless increased their sales, Mr. Scott said.

The company's factory at Wallasey had been sold and in its place two smaller premises had been acquired near the main factory and in a district where labour was available. It was intended that preparation work should be done at these small premises and the work completed at the main plant with the faster canning machinery now available.

A final dividend of 5% less tax was proposed, making 10% less tax for the year.

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Bemax sales soar

Sales of *Bemax* during 1955 set a new record in excess of anything achieved in the post-war era, said the chairman of the Vitamins Group, Mr. H. C. H. Graves, in his recent review with the accounts. The group was proud, he said, that it had maintained its steady reduction in prices, having lopped 15% from the price of its "permanised" Vitamin A and D_3 during the year and even more from other products. In addition to pharmaceuticals generally, fine chemicals, the newest branch of the group, had also had a record turnover. In the agricultural section, a deceleration in business which took place during the year had, during the current year, been successfully reversed. The company's new pig feed, *Vitamealo Supercon*, had fulfilled expectations.

Group profit after tax was £106,169 (£92,928) and an Ordinary dividend of 15% (same) was recommended, absorbing on an increased capital £33,638 (£26,846).

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"600" Group's record year

After a record year, the newly reorganised George Cohen 600 Group Ltd. (*see* FOOD MANUFACTURE, August, 1956, *p.* 348), faces the future with full order books and the determination not to raise its prices unless compelled by circumstances to do so.

Turnover during 1955 was £25·5 million, over £6 million higher than in the previous year, while net profits after tax amounted to £887,288 (£642,695).

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Record "Corona" profits

Profits for 1955 of Thomas and Evans Ltd., makers of *Corona* soft drinks, were the highest on record, said the chairman, Mr. W. D. James, at the company's recent annual meeting. He warned shareholders, however, that last year's particularly fine weather had contributed materially to the results which might not be repeated.

Considerable progress had been made in the re-organisation and re-equipping of the company's subsidiaries and the parent company's plans for development and expansion in the north-west had shown favourable results. In the grocery section several established shops had been acquired and the company now had four self-service stores. In this section sales were increasing and profits were being maintained.

It was proposed to pay a final Ordinary dividend of 20% less tax making 25% (22½%) less tax for the year.

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Brewery profits

The recovery in beer output and the rise in demand for bottled beer and soft drinks continue to be the main features of brewers' annual reports.

Sir Edward Mann, chairman of Mann, Crossman and Paulin, reported that sales of more expensive bottled beers are increasing. The company has increased its bottling capacity and there are now 70 agents bottling or handling their beer, including several brewers.

However, as Mr. Robert H. Butler, chairman of Mitchells and Butlers Ltd., warned, brewers' expenses are increasing with their profits. Although this group's turnover was £1,200,000, rising costs have cut trading profits to £70,000. The company's bottling plant is approaching the limit of its capacity, even with the additional machines installed two years ago—some of which are bottling beer at the rate of four bottles per second. Both bottling and storage capacities are to be increased and the first stage is nearly completed. The company made

Erections and Extensions

Box Packages, Ltd., are planning the erection of workrooms, stores and office premises on a site at the corner of Crown Street and Melbourne Street, Hulme, Manchester.

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Van Den Burghs and Jurgens, Ltd., have had plans prepared for the construction of extensions to their factory at Purfleet, Essex.

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North Lincolnshire Pre-Packers, Ltd., are planning to build a factory at Scotter Road, Scunthorpe.

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Daw's Creameries, Ltd., are to extend their premises in New Road, Saltash, Cornwall.

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Express Dairy (Northern), Ltd., are to have a cold store erected in Back Lane, Wakefield, Yorks.

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Exeter and District Meat Traders' Association of Exeter, Devon, are to build a new abattoir in the city.

J. Lyons and Co., Ltd., have had plans approved to build a cold store in Pipering Lane, Bentley with Arksey, Yorks.

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Pilkington Brothers, Ltd., glass container manufacturers, are having a factory erected at St. Asaph, Flintshire, N. Wales.

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W. and T. Avery, Ltd., weighing machine makers, are having warehouse and office premises built in High Street, Stratford, London, E.15, at a cost of £30,000.

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United Molasses Co., Ltd., have had plans prepared for the erection of a new storage building at Alexandra Dock, Hull.

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Fermanagh Joint Abattoir Committee will shortly have an abattoir erected at Enniskillen, Co., Fermanagh, N. Ireland, at an estimated cost of £50,000.

a dividend on the Ordinary stock of 7½%, making 12½% for the year.

Bottled beer increase. The Cornbrook Brewery Co. Ltd. showed a trading profit of £158,793 (£156,633), leaving a net profit of £74,484 (£69,192). Additions to this company's bottling plant last year are now in full operation. Speaking of bottled beer, the chairman, Lord Howard, recalled that fifty years ago the bottled beer trade was negligible but before the last war it was up to 38% of the total and now must be in the region of 40%, taking the country as a whole.

Warnings of a recession were given by the chairman of Ushers Wiltshire Brewery Ltd. The company made a consolidated net profit for the year of £84,428 (£81,237). This profit included the profit earned by Arnold and Hancock Ltd., whose issued share capital was acquired by Ushers.

A trend towards bottled beer, considerably expanded export sales of canned beer and higher sales of *Coca-Cola* were reported by Watney, Combe Reid and Co. Ltd. *Coca-Cola* has been developed by Watney in the south and by the Beechams group in the north of England. Now the two companies will take over complete control of their respective areas. Coca-Cola Southern Bottlers will become a wholly owned Watney subsidiary. Group trading profits for Watneys for the 15 months to September 30, 1955, totalled £2,840,025 (£2,095,074).

Group net profits of Bristol United Breweries Ltd. rose from £107,471 to £125,461. A total dividend of 12½% was paid on the Ordinary capital.

Smoked ham flavour

Smoked ham flavour has been produced by Söflor Ltd., primarily for use in sausage meats and potted meats. Söflor also recommend the flavour for use in soups to give a typical smoked meat odour; to give a savoury note to cocktail-type biscuits, and to improve the flavour of savoury spreads. The flavour is very powerful and persistent.

Low lactose synthetic milk powder

A special low lactose synthetic milk powder to replace milk in the dietary treatment of congenital galactosaemia has been developed by Trufood Ltd. Marketed under the registered name, *Galactomin*, this food, reconstituted in the normal 12½% solution, has a maximum lactose content of 22·8 mg. per pint.

The powder is prepared from liquid glucose, washed casein, vegetable fat, dicalcium phosphate, potassium carbonate, calcium hydroxide, calcium carbonate, calcium chloride, sodium chloride and magnesium oxide. A 1·8

In the laboratories of the British Food Manufacturing Industries Research Association at Leatherhead, Surrey, a chemist demonstrates before the camera the prototype of an instrument for testing the spreadability of margarine. This and other research work being done by the Association at Leatherhead has been made into a Pathe Pictorial colour film which will be shown in 800 cinemas over the next nine months.

solution in water produces a palatable milk with approximately the same composition in protein, fat, carbohydrate and mineral salts as human milk. Lactose is replaced by dextrin, maltose and dextrose which form the carbohydrate content. The product is packed in 14 oz. and 3 lb. tins.

New soups

A new range of Unox soups recently launched on the Scottish market is made from fresh vegetables and cereals, from which only the water has been removed by a vacuum process carried out at low temperature. The soup mix is stirred into boiling water and heated gently for approximately 10 min. thus avoiding the necessary long cooking period involved in the preparation of home-made soups which results in an appreciable loss of vitamin C.

Unox mixed vegetable soup will have a calorie value of at least 55 calories and, with the presence of noodles the figure is increased to 60 to 70 cal. per 4 oz. portion, which compares well with the published figures for other soups. A canned scotch broth was found to give 51 cal. per 4 oz., and two samples of canned clear soups gave 19 and 11 cal. respectively.

The four varieties available are: mixed vegetable, chicken noodle, thick meat broth, all 1s. 3d. per packet, and thick pea, 1s. 5d. per packet.

Foster Clark rebuild

Work on site clearance for Foster Clark's new canning factory in Hart Street, Maidstone, Kent, is well under way. This section of the company's works suffered heavy flying bomb damage in 1944, and has since been used only for storage.

When complete and equipped, this new section, covering 50,000 sq. ft. and costing over £150,000, will enable the company to vastly increase their present canning production of fruits and vegetables.

London factory will handle 10,000 pigs a week

When extensions to the pig and bacon factory of T. Wall and Sons, Ltd., Willesden, London, N.W., are completed, the factory will be the largest of its kind in Britain, with a weekly productive capacity of 10,000 pigs. Foundation work has already started on the extensions which will be on two floors and will incorporate machinery designed especially for Wall's.

Mr. Collan E. B. Brett, director in charge of the factory, said: "Although production will be doubled, our labour force will remain the same as we shall make increased use of mechanical handling."

The factory, built in 1935, has handled up to 6,000 pigs a week by working a 24-hr. day.

A. Johnson and Co. (London) Ltd.

The capacity of the vertical yeast fermentation vessel illustrated in the advertisement of A. Johnson and Co. (London) Ltd. in the September issue of FOOD MANUFACTURE, (*p.* lxvii), is 18,000 gal. and not 1,800 gal. as stated.

Beckman agents

A. Gallenkamp and Co. Ltd., in their capacity as authorised agents for Beckman Instruments, Inc., have recently supplied a number of spectrophotometers and other instruments, which are now available in this country, subject to import licence, from the Beckman factories in Western Germany and U.S.A.

Food firm's new magazine

A new house magazine, *Newsletter*, recently published by David Greig Ltd. of London, S.E.1, is in 4-page newspaper format. The first edition sets the style for future issues which will include a wide variety of articles, some of technical value, others of general interest, in addition to the customary domestic and departmental news items.

People

MR. V. B. DIEHL has been appointed chairman of Nabisco Foods, Ltd. (formerly the Shredded Wheat Co.) in place of MR. R. K. KELLEY, who has returned to the U.S. to take up an appointment of assistant to the president of the Dromedary division of National Biscuit Co. in New York.

*

MR. W. J. FARRAND, B.SC.(ENG.), has been appointed manager of the food engineering department of Henry Simon Ltd. The department is responsible for the design and construction of bulk flour handling and storage plants in mills, bread bakeries and biscuit factories, and also for the supply of bulk flour delivery wagons. Mr. Farrand has been concerned in the development of the food engineering department for several years, prior to which he served in the research and development department, working particularly on questions concerned with the pneumatic conveying of flour and sugar.

*

DR. J. B. M. COPPOCK (British Baking Industries Research Association, Chorleywood) and DR. C. R. JONES (Research Association of British Flour Millers, Old London Road, St. Albans) have been appointed corresponding editors for Great Britain of *Cereal Science Today*, the new journal of the American Association of Cereal Chemists. In this capacity they would welcome intimation of events or developments of potential interest to readers of the journal. Dr. Coppock's interests lie particularly in the field of baking and confectionery and those of Dr. Jones in grain and milling processes, but communications may be sent to either.

*

MR. A. J. GLASSBROOK, production manager at the Sheffield factory of Batchelors Peas Ltd., and deputy to the general works manager, has been appointed to assist the production director as co-ordinator of dried pea preparation activities. These new duties are extensive, covering all the company's factories at Sheffield, Southall, Worksop, East Bridgford, and eventually the new factory being built at Ashford. Mr. Glassbrook, who is 46, has been 26 years with Batchelors.

His duties at Sheffield have been taken over by MR. B. MUSCOTT, who has joined the company from another canning company, where he was a factory manager. At Sheffield, where he took up his duties on August 13, he has the post of assistant general works manager. He is 34 and has a degree in agriculture of Cambridge University.

Mr. A. J. Glassbrook

DR. F. H. BANFIELD, director of research of the British Food Manufacturing Industries Research Association, has been elected a Fellow of the Royal Society of Health.

*

DR. J. DUCKWORTH, of the Rowett Research Institute, Aberdeen, has been seconded for a year to the Food and Agricultural Organisation of the United Nations for nutritional work in Central America, with headquarters in Guatemala city.

*

MISS E. J. STRAUGHAN, acting personnel officer for the factory of Batchelors Peas, Ltd., at Worksop, Notts., has been appointed personnel officer at this factory and at the one at East Bridgford. She joined the company early in 1954.

*

MR. J. C. BRYANS, F.G.I., chief sales manager of the Crosse and Blackwell Group, has retired. At a luncheon held recently at the Dorchester Hotel, London, a presentation was made to him by the chairman, Mr. Roy Matthews, C.B.E., F.G.I., in acknowledgment of his outstanding services to the company since he first joined it in 1925.

Obituary

MR. F. H. PRIEST, manager of the Mitcham Works of W. J. Bush and Co. Ltd., for over 50 years, died recently at the age of 75. He was a well-known personality in Mitcham through his many activities and interests, chief of which was the Mitcham Athletic Club, of which he was president for 20 years. At various periods he was also president of the Mitcham Amateur Boxing Club and of the Surrey County A.A.A. He was a popular member of the Mitcham Conservative Club, from the chairmanship of which he retired last year after holding office for three years.

"All who knew Fred Priest best have good reason for holding in happy memory his great qualities of integrity, courage, hard work, great ability and unfailing humour," say Bush's directors.

He leaves a widow, a daughter and a son, Mr. F. W. Priest, who succeeds him as manager of the Bush Mitcham Works.

Mr. W. J. Farrand

Events

The Chemical Society

October 4. "On the Nature of Meat," by Dr. E. H. Callow, 7 p.m., Chemistry Department, The University, Bristol.

October 18. "The Chemistry of Vitamin B_{12}," by Prof. A. W. Johnson, 7.30 p.m., Chemistry Lecture Theatre, Sheffield University.

Society of Chemical Industry

Oils and Fats Group

October 5. "Creaming and other Tests in the Assessment of Bakery Fats," by F. J. H. Ottaway, and F. J. Cornford. This cancels previous notice (*see* FOOD MANUFACTURE, September, 1956, *p.* 398).

Nutrition Society

October 6. The Nutrition of Laboratory Animals. Joint symposium with the Laboratory Animals Bureau, 10.40 a.m., Guy's Hospital Medical School, St. Thomas Street, London, S.E.1.

Food News Overseas

Soya plant in Buenos Aires

A plant for processing soya beans into oil, meal, etc., will be set up in Buenos Aires by the Glidden Co., New York, in association with Brandt Laboratories. They expect to start activities in 1957.

Vinegar plant

A German-equipped and operated vinegar plant was recently opened in Caracas, Venezuela. Its capacity is two million litres per annum, but current consumption is only 1·6 million litres, all hitherto imported.

New African sugar refinery

Construction of a new sugar refinery at Jacob in the Niari Valley, halfway between Brazzaville and Pointe Noire, French Equatorial Africa, is scheduled to go into production this month. The refinery, which will process sugar-cane grown on 7,500 acres nearby, will produce 10,000 tons of refined sugar a year, sufficient to meet almost the whole of the present requirements of French Equatorial Africa. A new town, with a population of 8,000, is to be built to house the factory and plantation workers.

New plants in Hungary

Hungary's new brewery at Nagykanizsa, which opened only in July, is already planning to increase its output. New buildings to be added soon will raise annual output from the present level of 4,400,000 gal. to 5,500,000 gal.

Another new development in Hungary is the rebuilding of one of her biggest cheese factories—at Gógánfa, County Veszprém. The rebuilding cost £45,000.

Fitted with new automatic equipment, the factory can now process 4,000 gal. of milk a day, and make 600 tons of cheese a year.

Dublin meat plant enlarged

Irish Meat Packers Ltd., manufacturers of *Steer* brand canned meats catering mainly for the export market, have built an extension to their premises at Barnhall, Leixlip, Co. Dublin.

Pre-packed meat for the U.S. Air Force exchange control system, which runs all stores and cafeterias at U.S. camps in Europe, is one of the firm's specialities. The complete process, from slaughter to canning, freezing or chilling, and disposal of the by-products, is conducted on site. Apart from pre-packaged meat, hamburger patties, chilled and frozen meats, the firm also can corned beef, stewed steak, beef and gravy, and ox tongue, and handle a large volume of carcase beef, both chilled and frozen. (Their chilling premises is capable of accommodating up to 700 beasts.)

Kraft buy Danish firm

The firm of Peter Jensen A/S, said to be the largest cheese merchants in Europe, was recently sold to the U.S. Kraft Food concern for Kr. 10 million. Kraft will set up a Danish company to be called "Kraft Foods International A/S." Kraft companies are said to buy about Kr. 25 million worth of Danish cheese annually.

New sugar refining technique

An ion exclusion process that removes mineral salts which hinder the crystallisation of sugar from cane, beet or other sources has been demonstrated in a pilot plant at Rockford, Illinois. The project, aimed at reducing losses in the sugar industry, is a co-operative effort by researchers of the Illinois Water Treatment Co., the Dow Chemical Co., and the Ultro Sucro Co.

It is claimed that the process will widen the refinery margin of profit and increase sugar recovery from raw sources by up to 12½%.

Revival of Argentine meat board

The Argentine National Meat Board (Junta Nacional de Carnes) has been revived. This was originally created in 1933, was replaced under the Perón regime by the Government-dominated National Meat Institute, and now in turn supersedes the latter. The purpose of the board, which is an autonomous body directed by 10 members, is to promote production and to regulate the trade in and industrialisation of livestock and meat, to increase and cheapen local consumption and to promote exports especially to new markets. The president is nominated by the Ministry of Agriculture, four other members by Economic Ministries and the remaining five represent the producers. Funds will come from a levy of 2½% on the sale of all cattle, sheep and pigs, home and abroad. The meat-packing companies feel that the Board's policy will be biased by the producers and have protested to the Government that they have no representation.

India to join the I.W.A.

India has decided to join the International Wheat Agreement for three years beginning in August. Her quota of wheat will be 200,000 metric tons against one million metric tons under the agreement expiring in July.

Sugar from beet, cane and sorghum

If experiments in the newly established Israel Sugar Works in Afula are successful, this factory will be the first in the world to produce sugar from beet, cane and sorghum. The works, which already produce sugar from locally raised beet and refines raw imported sugar, has extra equipment enabling it to deal with the cane and sweet sorghum.

Quicker ice blocks

A quicker method of manufacturing ice blocks is reported from the Netherlands where the Glasso ice block plant makes possible a 90% saving in time. Giving this information recently, the European Productivity Agency explains that the plant consists of four bundles of eight closely spaced tubes which are closed at the top. These pipes, a metre long, project upwards in a water-filled tank and are connected at the bottom by a system of supply and discharge pipes and three-way cocks to an electrically driven ammonia refrigerator.

When the three-way cocks are placed in the appropriate position, evaporating ammonia is sucked through the tubes, causing ice to form on the outside. Since the tubes are so close together, these ice coatings combine to form a compact ice block. At the end of the freezing process, which lasts two hours as compared with the 22-23 hr. of the conventional Dutch plants, the cocks are turned to allow condensing ammonia to flow through the tubes. A quarter of an hour later, the ice block detaches itself from the tubes, shoots to the surface of the tank of its own accord, owing to the difference in density, and is lifted out by means of a grab. Blocks produced by this method have rounded corners and contain the eight holes formed by the tubes.

According to a writer in the Dutch journal *Metaalbewerking* the blocks melt no more quickly than those made in the conventional way and can be stacked more easily.

Market test for potato flakes

Potato flakes developed by the Eastern Utilisation Research Branch of the U.S. Dept. of Agriculture are to be sold in Binghampton, N.Y., as a market test. Tentative plans are for the production of about 20,000 "consumer units" of potato flakes.

It is claimed that the addition of water and milk will reconstitute the flakes to make a delicious mashed potato.

Bulk wine terminal port

The first port of New York waterfront bulk wine terminal, with a direct pipeline service for T-2 tankers, will be built by the port of New York authority at Port Newark at a cost of about $1,200,000 for lease to the Petri Wine Co. of San Francisco.

Petri, producer and wholesaler of domestic wines, will occupy the new facilities for ten years at a rental of about $100,000 annually, beginning on completion of the structure about September 1, 1957. The terminal will be served by four pipelines capable of handling four types of wine simultaneously. Petri now ships some 14 million gal. or 60,000 tons, of bulk wine annually by rail from the West Coast area.

Vanishing whales

According to Dr. R. C. Chittleborough, research officer of the fisheries division of the Council of Scientific and Industrial Research of Australia, the Antarctic whaling industry, worth millions of pounds, is likely to collapse if the catching of fin whales continues at the present rate. Ninety per cent. of last season's Antarctic catch consisted of fin whales, and whales were decreasing seriously under the pressure of modern whaling methods.

A plea by scientists for the reduction of fin whale quotas by 30% was unacceptable to the nations involved, who would not agree to even 3½%.

Dietetics congress

The raising of nutritional standards was the theme of the 2nd International Congress of Dietetics, held in Rome from September 10 to 14. The main points discussed were: (1) recent emphasis on research applied to the improvement of nutrition, (2) principles and problems involved in feeding large groups of people, (3) educational approach to better nutrition, and (4) the training of dieteticians.

In conjunction with the congress, the Italian Dietetics Association, in collaboration with the International Interim Committee of Dieteticians, organised an international exhibition of food and dietetics. In addition to all kinds of foodstuffs, exhibits included, domestic utensils, and all kinds of equipment.

Technical Press Review October

Automation Progress.—Materials Handling Equipment for the Automatic Factory; Electronic Control of Machine Tools; The Fully Automatic Plant; Plug-in Digital Computers; Electronic Wage Accountancy; The Automation of Laboratory Analytical Techniques; In-Line Transfer Machining of Cylinder Blocks; Air Gauging Aids Automatic Production.

Dairy Engineering.—Mechanical Causes of Sub-Normal Milk; Plastic Road Tankers for Milk Transport; Butter and Cheese Grading in Practice; Cooling of Milk at the Production Point; Fuel Efficiency in the Dairy Plant.

World Crops.—Managing Irrigated Soils; Tea Soils and their Management; Cure and Prevention of Virus Diseases in Plants.

Manufacturing Chemist.—Planning and Controlling Research in a Pharmaceutical Company; Health and Hygiene in the Fine Chemicals Industry; Chelating Agents; Pest Control Chemicals.

Chemical and Process Engineering.—Corrosion and Construction Problems of Sulphuric Acid Plant; Ion Exchange; Industrial Applications of Foam; Depreciation and Maintenance Costs of Chemical Plant.

Corrosion Technology. — Nickel Plating by Chemical Reduction; Reduction of Corrosion in Ships' Cargo Tanks by Dehumidification; Organic Corrosion by Synthetic Plastics.

Paint Manufacture.—Automatic Control in the Paint Industry; Instrumentation for the Factory; Paints without Odour; The Ministry of Supply Exposure Site at Glascoed; The Perivale Factory of General and Industrial Paints Ltd.

Building Materials.—Fire Tests of Gypsum Roofing; Oil-Burning Appliances; Concreting in Cold Weather.

Petroleum.—Trends in Lubricating Oil Requirements; Infra-Red Absorption Analysis in the Petroleum Refinery.

Floors.—Wood—Its Properties as a Flooring Material for Various Purposes; Chemical Resisting Industrial Flooring.

Textiles in Industry.—Industrial Textiles in Fire Protection.

Packaged beef shipments

Trial shipments of snap-frozen cuts of beef, attractively packaged in plastic bags for delivery to United Kingdom housewives, have been made by cargo vessels from Wyndham, in the far north of Western Australia.

The shipments are part of a token shipment that may help Australia to compete more successfully against Argentine chilled meat, and are another vital experiment by Air Beef Pty. Ltd., which pioneered in Australia the aerial transport of carcase beef from the big cattle stations inland in the Kimberleys to the Wyndham seaboard.

The refrigerated ship *Port Lyttleton*, which sailed recently from Wyndham, carried 18 tons of beef ready cut for English households.

The whole consignment was snap-frozen at Glenroy Station, Air Beef's inland depot and killing centre.

Overseas Enquiry

Sicily: citrus packing plant

Dr. Abadessa, managing director of S.A.C.O.S. (Societa' Anonima Centrali Ortofrutticole Siciliane)—Via Stabile, 139, Palermo, would like to receive detailed offers from British manufacturers for machinery for handling citrus fruit only. If similar machines exist for tomatoes as well, he would be interested, but the order would only be for a maximum of three. He would also like to receive details of wire packing machinery.

S.A.C.O.S. plan to set up 16 packing houses in Sicily—13 for citrus fruits and 3 for vegetables only.

A pilot citrus packing station now being built at Bagneria, near Palermo, should start operating in March or April, 1956. For this plant a complete set of machines is on order from the U.S.A. These machines will wash, dry, polish, disinfect and grade (by size) the citrus fruit which then will be fed on to a series of vibrating belt conveyors for colour-grading by hand.

The development of the rest of the chain of S.A.C.O.S. packing centres will depend on the experience gained in the running of the Bagheria one.

Although it will only be known after experience at Bagheria, whether refrigeration plant will be required or not, Dr. Abadessa, who has already received Italian, French and German catalogues and prices for such plants, would appreciate receiving United Kingdom ones as well. These would help S.A.C.O.S. to estimate eventual cost of their chain of packing stations. If refrigeration plant is required, tenders would probably be invited.

Interested manufacturers should write direct to Dr. Abadessa giving full details of their offers with prices and catalogues, at the same time notifying the British Consulate, Via Caltanisetta 1, Palermo.

Packaging

Sausages . . . both pork, both skinless. Wall's pack theirs in transparent cellulose, but Drings supply the "frying pan" too—a foil tray with a transparent overwrap.

Tear-strip case

A new two-in-one fibreboard case, which opens by merely pulling a tab of *Rippatape* cotton pressure-sensitive tape round the centre of the case, has been designed by Ashton Containers Ltd. Besides making the case easy to open, the tape facilitates the breakdown of 56 × ½ lb. pats of butter into two separate packs of 28 × ½ lb. pats. The new cases are used by Empire Dairies Ltd.

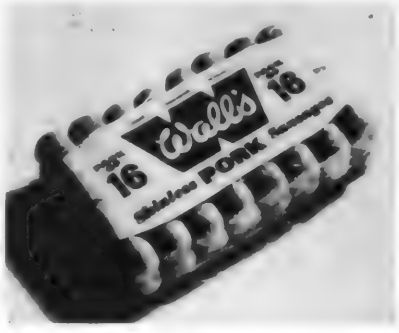
Foil tray for sausages

Drings Ltd., the Wembley food manufacturers, have adopted a new pack of 1 lb. of skinless pork sausages in an aluminium foil tray.

The tray, which measures 8 in. × 5 in. × 1½ in., is made by the Prestige Group Ltd. from 0·002 in. gauge foil supplied by Venesta Ltd. It has a beaded rim, rounded corners, and is dished or ribbed on the base to give added strength.

In addition to the sales appeal and improved qualities of handling and hygiene claimed for the tray, the foil is said neither to absorb nor exude moisture, thus helping to maintain the product at an even temperature. The tray can also be used for frying over a spirit stove for camping, picnics, etc.

Two-in-one case for butter.



Gammon in sealed packs

Excel Co. Ltd., who recently introduced their British-made pre-cooked frankfurters in *Cryovac* packs, have now extended the use of this packaging system to their gammons and shoulder bacon.

Among the advantages claimed for the system is improved hygiene, longer shelf life and better colour retention than when an unsealed wrapper is used.

It has also been found that *Cryovac* packs, because they are shrunk tightly on to the products, keep the gammons and shoulders in a perfect shape for slicing, and that the vacuum-sealed pack virtually eliminates loss in weight. Tests carried out at Excel showed that a 10 lb. gammon lost only ½ oz. in eight weeks. The weight loss from an ordinary unsealed pack was almost ¼ lb. in less than one week.

Cellulose-steel wire

The Packaging Division of John Gosheron and Co. Ltd. have made a further addition to their range of products with *Twistseal*, a special cellulose film bonded to fine strands of sheel wire. It is available in a range of colours and is manufactured in two widths, namely 5 and 10 m.m.

In addition to all types of bag sealing *Twistseal* has also been used for colour identification on steel and component parts and is said to have proved a useful accessory in the decorative field of pre-packed goods. Other more general uses are for stringing, banding and thronging. *Twistseal* can be moulded by finger touch into any position with speed and efficiency and an effective seal can be made by twisting.

New can loading machine

The Container Corp. of America has designed a low-cost medium-speed machine for loading cans into multiple packages. The machine will load up to 50 cartons per min. and can handle two, three or four can multiple packages. One operator can run two machines, according to the Corp. as cans are fed and loaded automatically, the operator simply keeping the carton hopper full.

Fish packaging

The various types of packages made by the Metal Box Co. Ltd. were on show at last month's Grimsby Fish Docks Centenary Exhibition. These included cans for processed fish, cartons, composites, and tough, transparent *Diothene* bags for frozen fish, and containers for fish products.

Measuring water vapour penetration

Czech research scientists, working at the Food Packaging Research Institute, have developed a new method for the continuous measurement of water vapour penetration by means of electric measurement of the relative humidity of the air, according to *J. Hanouseh*, (*Obaly*, 1956, **2**, 4.). The method is based on the use of the electric measurement of the resistance of a cell with a hygroscopic film, as a function of the relative humidity of the air. The penetration curve thus plotted will permit the calculation, from the tangents of the curve, the velocity of penetration of water vapours for any increase in humidity and hence the standard of quality required from the packaging material for a specific product.

New Companies

H. Alexander and Co., Ltd. (568585.) 37, Gt. Russell Street, London, W.C.1. Importers, exporters and mchts. of and dlrs. in whisky, gin, rum, spirits, beers, etc. £100. Dir.: H. A. Hillman.

Appleton and Sons, Ltd. (568726.) 205, High Street, Walthamstow, London, E.17. Retailers, wholesalers, mnfrs. of and dlrs. in sweets, chocolates, etc. £2,000. Dirs.: H. N. and Gladys M. Appleton.

Armett, Ltd. (568771.) 303, Chiswick High Road, London, W.4. Fruiterers and greengrocers, growers of and dlrs. in fruit and vegetables, etc. £1,000. Dirs.: H. Petrook and C. E. Hewett.

Thomas Baty (Newcastle upon Tyne), Ltd. (568998.) Retailers, wholesalers, mchts., importers, exporters, salesmen, auctioneers, factors, brokers and commission agents in respect of and dlrs. in potatoes, carrots, onions and other vegetables, etc. £1,000. Dirs.: A. T. Baty, 3, Moor Crescent, Gosforth, Newcastle-on-Tyne (permt.), T. C. Baty, Jessie Baty (permt.), and D. Baty.

Balyham Fruit, Ltd. (568787.) Fruit growers, etc. £100. Subs.: J. E. C. Mitchell, The Old Vicarage, Shorne, nr. Gravesend (solr.), and G. X. Constantine.

T. W. Bell and Son, Ltd. (568875.) 4, Valley Bridge Parade, Scarborough. Corn and grain factors and brokers, etc. £5,000. Dirs.: T. W. Bell (permt. mangr.) and Mrs. M. A. Bell, H. W. Bell (permt.) and Mrs. B. Bell.

H. A. Bower and Sons, Ltd. (568742.) 71, Newland Avenue, Hull. Pork butcher. £5,000. Dirs.: H. A., Mrs. K. and A. R. Bower.

J. J. Brooks and Son, Ltd. (568429.) Westborough Chambers, Maidstone, Kent. Grocers, provn. mchts., wine, beer and spirit mchts., greengrocers and fruiterers. £3,000. Dirs.: J. J., Mary J and J. G. Brooks.

Bryan's (Pork), Ltd. (568732.) 3a/5a, Exchange Walk, Nottingham. Pork butchers, etc. £2,500. Dirs.: H. A. Smith and H. S. Rayner.

Coral Confectionery Co., Ltd. (568906.) 10, Gt. Queen Street, London, W.C.2. £15,000. Dirs.: W. B. Stocker, F. Bernhart and H. H. Pollock.

Dower, Wood and Co., Ltd. (568910.) Dlrs. and mchts. in barley, corn, maize, rice, wheat and other cereals, etc. £15,000. Subs.: E. J. Hellings, 6, Wilverley Crescent, New Malden, Surrey (clk.), and N. J. Adie.

Gold Label (Frosted Foods), Ltd. (568583.) 9, Curzon Place, London, W.1. £1,000. Dirs.: S. Wagner and Renee Wagner.

C. T. Grimes and Co., Ltd. (568972.) Imperial Buildings, 56, Kingsway, London, W.C.2. Mchts. and salesmen, improvers, packers, importers and exporters of eggs, provns., etc.. £40,000. Dirs.: C. T. Grimes and H. W. Sampson.

John Harrison and Sons (Fruit Merchants), Ltd. (568924.) 84, Colemore Row, Birmingham. Wholesale fruit and vegetable mchts. and potato mchts. £6,000. Permt. dirs.: C. J. A. and N. J. Harrison, and J. L. S. Hemingway.

Trade Marks

APPLICATIONS

FREEZADOR.—Refrigerators and parts thereof included in Class 2. **The Hotpoint Electric Appliance Co., Ltd.,** Crown House, Aldwych, London, W.C.2.

GOLDEN DIAMOND.—744,699. Canned vegetables, canned fish, edible lard, butter and margarine. **A. Mathews and Skailes, Ltd.,** 5, 7 and 9, London Bridge Street, London Bridge, London, S.E.1.

ST. IVELACTIC.—748,406. Milk; and milk products and dairy products, all for human consumption. **Aplin and Barrett, Ltd.,** Newton Road, Yeovil, Somerset.

BRAM.—B749,062. Canned meats. **Antony Worham, Ltd.,** 19, Eastcheap, London, E.C.3.

HARRIS CROWN.—749,430. Cooked, canned and preserved fish, meat, poultry and vegetables; edible lard, fish, meat, poultry and game pastes; and stuffings and seasonings made principally of dried herbs and vegetables. **C. and T. Harris (Calne), Ltd.,** Calne, Wilts.

DAIRYGLEN.—750,639. Canned cream, canned soups, meat pastes and fish pastes. **London Grocers, Ltd.,** Dairyglen House, Crossbrook Street, Waltham Cross, Herts.

TURNMILL.—751,463. Cheese. **Auguste Noel, Ltd.,** 79, Turnmill Street, Smithfield, London, E.C.1.

DEVAPAK.—751,574. Dead poultry. **Chester Farmers, Ltd.,** Cow Lane Bridge, Chester.

MEGG.—751,729. Luncheon meat containing egg. **A. Mathews and Skailes, Ltd.,** 5, 7 and 9, London Bridge Street, London Bridge, London, S.E.1.

HIGHLAND CHIEF.—745,966. Non-medicated sugar confectionery. **Chix Confectionery Co., Ltd.,** 15D, Argyle Avenue, Trading Estate, Slough, Bucks.

SLIMVIN.—748,262. Cyder vinegar. **Francis Samuel Fawsitt,** Cyder Mills, Banham, Norfolk.

DAIRYDALE.—749,194. Toffees and sugar confectionery (not medicated). **H. W. Atterton, Ltd.,** Dairydale Toffee Works, Station Road, Redcar, Yorks.

HARRIS CROWN.—749,431. Sausage rolls, pasties, meat pies, meat puddings, dried bread crumbs; and stuffings and seasonings, all principally of cereal preparations. **C. and T. Harris (Calne), Ltd.,** Calne, Wilts.

TOBLER BEARS.—750,240. Chocolate medallions depicting figures of bears. **Chocolat Tobler, Ltd.,** 20, Soho Square, London, W.1.

LEMZADE.—750,805. Non-medicated confectionery flavoured with oil of lemon. **The Maxilin Marketing Co., Ltd.,** Maxilin House, Sharples Vale, Astley Bridge, Bolton, Lancs.

SPUR.—751,048. Biscuits (other than biscuits for animals). **William Macdonald and Sons (Biscuits), Ltd.,** Glengarry Biscuit Bakery, Earl Haig Road, Hillington, Glasgow, S.W.2.

ARAPAN.—751,194. Non-medicated nut confectionery. **Burton, Son and Sanders, Ltd.,** 8, College Street and St. Peter's Wharf, Ipswich.

SUNGLOW.—751,417. Bread and flour confectionery. **Burton's Model Bakery (Hereford), Ltd.,** The Bakery, West Street, Hereford.

OSTERMILK.—749,720. Foodstuffs, all containing milk or milk derivatives, for animals. **Glaxo Laboratories, Ltd.,** 891-995, Greenford Road, Greenford, Middlesex.

COMPANY MEETING

GEO. ADLAM & SONS

Changing Pattern of Trade

The 49th ordinary general meeting of Geo. Adlam and Sons Limited was held on August 31 at Bristol, Mr. W. Walker, J.P., F.A.C.C.A. (the chairman), presiding.

The following is an extract from his circulated statement:

The Profit for the year, before Tax, was £42,147 compared with £40,197 in the preceding year. Provisions for Taxation, however, are higher, so that the net available taxed profit is lower at £17,747 against £19,186. Provisions for staff bonuses, dividend on preference shares, and the proposed ordinary dividend, leave a net addition to the Profit and Loss Account of £5,774.

In 1952 the excess of liabilities over current assets was no less than £83,000. This position has gradually improved, and, for the first time since the Board was reconstructed, the current assets exceed the current liabilities by some £19,000: over the three years from March, 1953, to March, 1956, the Bank overdraft has been reduced by £160,000, and the amounts due to the unsecured noteholders by £19,000. The net taxed balance on Profit and Loss Account retained in the business at March, 1953, was £15,333, and at March, 1956, £36,414, after a capital distribution in the meantime of £25,000. The total Issued Ordinary Capital of £50,000 is represented by Capital and Reserves of £155,000.

The brewery sales order book is somewhat better than last year, but the whole nature of the brewery engineering industry has changed. The Company no longer has so many large long-term schemes in hand, due partly to amalgamations in the industry and partly to the present financial restrictions, which have held up certain proposed schemes. The business on the brewery engineering side is now more in the way of replacement and general improvement, in which there is still a fair amount of business.

New Developments

I have mentioned in earlier years the reorganisation which took place in the works with a view to expanding the scope of the business so as to allow for this probable and expected decline in the size of the brewery engineering business from that immediately after the war. The Company has other developments in hand of a contract nature, which will take some time to reach full production.

Having regard to the need to conserve resources for new developments and continue improving the Company's liquid position, the Directors have decided to recommend a dividend the same as for the previous year.

The report was adopted.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Mushroom dehydration

B.7875. *Can you please supply any information regarding the drying or desiccation of mushrooms?* (Worthing, Sussex)

There appears to be very little literature on mushroom dehydration and the product is still in an experimental stage. Experts in this country have so far only succeeded in achieving a product suitable for soup manufacture but too leathery for any other purpose. Nevertheless, in the small amount of American literature on the subject it is claimed that the texture of the reconstituted dehydrated mushroom is soft and tender.

The most comprehensive article on the subject appears to be: J. J. Brunell, W. B. Esselen, Jnr., and F. P. Griffiths, "Methods for quick-freezing and dehydration of mushrooms" (*Food Ind.*, 1943, **15**, 11, 74). There is also a short reference in H. W. von Loesecke's "Drying and Dehydration of Foods" (2nd Edn., 1955, New York, Reinhold, p. 113).

Chocolate coated ice cream

B.7895. *What is the best method of making a chocolate couverture for coating ice cream, and can you suggest a recipe?* (Kingston, Jamaica)

The following recipes might be used as a basis for experiment:

	Dark Coating per cent.	*Milk Coating per cent.*
Chocolate solids-not-fat ..	15·0	7·0
Total fat	55·0	55·0
Sugar	29·3	28·3
Milk solids-not-fat ..	—	9·0
Lecithin	0·3	0·3
Moisture	0·4	0·4

Coating chocolate usually contains 50 to 60% cocoa fat, 25 to 40% sugar and, if milk chocolate coating is used, 10 to 12% milk solids. Lecithin (0·2 to 0·3%) is sometimes added to prevent moisture thickening, which may result from prolonged dipping. The correct chocolate dipping temperature varies with the melting point of the fats present. When using a coating containing cocoa fat and a small amount of coconut oil, allow a temperature of about 110°F. For a better yield and smoother covering, agitate the coating at the dipping temperature for 3 to 4 hr. prior to dipping. Refrigerate the bars as soon as they are packaged.

Tomato drink

B.7911. *Please give us a recipe for a tomato drink.* (Ballymena)

Pre-heat clean, good-quality tomatoes (whole or chopped) so that the interior of the tomato reaches a temperature of 100°F. Remove the juice in an extractor. The air in the juice tends to impair the flavour and colour, so deaeration is usually applied after extraction and sometimes also after pasteurisation. Add salt if desired (from 4 to 6 lb. to 100 gal. of juice). To prevent settling and separation, the juice can also be passed through a homogeniser. Tomato juice may be processed before or after filling into the container, and to do so before filling, heat the juice to about 240 to 270°F. and then cool to a suitable filling temperature.

Full details are given in "The Chemistry and Technology of Fruit and Vegetable Juice Production," by D. K. Tressler and M. A. Joslyn, published by Avi Publishing Co., New York, 1954.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.7852. *Suppliers of machinery for skinning nuts.* (Yaba, Nigeria)

B.7853. *Recipes for baking flow and synthetic flavours.* (Montevideo, Uruguay)

B.7854. *Formula for jams and beverages for diabetics.* (Beirut, Lebanon)

B.7855. *Production of frozen sweetened yolk.* (Milan, Italy)

B.7856. *Manufacturers of filling machine for viscous products.* (Cork, Ireland)

B.7861. *Machine for forming plastic sausage containers.* (Warrington, Lancs.)

B.7862. *Manufacturer of peach slicing machine.* (London, S.E.1)

B.7863. *Slow steam pressure cleaning plant.* (Inverness, Scotland)

B.7865. *Preparation of yeast powder, etc.* (Amoy, China)

B.7866. *Dehydration of vegetables.* (Dublin. Ireland)

B.7867. *Information and recipe on the making of salad cream.* (Blackpool)

B.7868. *Formulæ for tomato, oxtail, kidney and pea soup powders.* (London, S.E.14)

B.7875. *Drying of mushrooms.* (Worthing, Sussex)

B.7877. *Manufacturers of machinery for making mayonnaise.* (Shokai, Tokyo)

B.7878. *Storage of apples for mincemeat.* (Glasgow)

B.7881. *Formulæ for manufacture of ice cream.* (Auckland, N.Z.)

B.7885. *Handling and bottling lager and beer.* (Killarney, Ireland)

B.7886. *Suppliers of equipment for broiling chickens.* (Dublin, Ireland)

B.7887. *Manufacturers of drying equipment.* (Waterford, Ireland)

B.7889. *Possible suppliers of amylopectin glycollate.* (London, E.8)

B.7890. *Packing pressed beef in cans.* (Tipton, Staffs.)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

756,730. J. DALTON: Potato or like harvesters.

756,361. G. SALAMAN: Cutting and preparation of grapefruit and the like.

756,566. M. A. FLADMARK: Process and apparatus for the treatment of whale meat and other parts of whales to recover useful products therefrom.

756,632. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION: Method of producing egg substitutes for use in the production of sponges, cakes, and similar baked goods.

755,727. UNILEVER, LTD.: Manufacture of butter.

755,842. BRAUNSCHWEIGISCHE MASCHINEN-BAUANSTALT AKT.-GES.: Process for the production of sugar from a substantially anhydrous mixture of sugar and non-sugar substances.

755,750. GENERAL FOODS CORP.: Method for preparing quick-cooking rice.

755,772. W. W. TRIGGS (Kraft Foods Co.): Method of making grated high-fat cheese.

755,783. POOR AND CO.: Acid pickling compositions and methods of pickling.

755,895. WILTS UNITED DAIRIES, LTD.: Combined egg-box and unloading stand therefor.

755,798. ABBOTT LABORATORIES: Animal feed compositions.

755,233. A./B. ARVIKA-VERKEN: Beet-topping machine.

755,237. T. AND T. VICARS, LTD., J. F. NAYLOR, and J. EATON: Bakers' and like ovens.

755,443. AKTIESELSKABET ATLAS: Process and machine for cutting fillets from fish.

755,593. W. F. STRAUB AND CO.: Honey-containing product and method of producing same.

754,951. FORGROVE MACHINERY CO. LTD.: Automatic feeding of confectionery to wrapping machines.

754,771. GENERAL FOODS CORP.: Coated cereals.

755,073. A./B. HALLANDS FRÖKONTOR: Devices for cleansing cereals and similar granular materials.

755,006. AVCO MANUFACTURING CORP.: Food receptacle.

755,210. ALEXANDERWERK AKT.-GES.: Sausage filling machines.

757,110. W. P. G. SECK: Manufacture of chocolate.

757,041. F. A. STANDEN AND SONS, LTD., and P. STANDEN: Mechanical harvesting of beet and like root crops.

757,008. Y. L. L. GROUSELLE: Trawls and like fishing nets.

757,168. HOOVER, LTD. (Hoover Co.): Food mixers.

757,182. T. SAETRE: Apparatus for washing coffee beans and similar shaped objects.

757,994. A. BRICE: Apparatus for sorting weeds, stones and the like from potatoes or other crops or vegetables.

758,015. R. H. PIKE and R. BALLINGER: Apparatus for distributing seeds, fertilisers and other powdered and granular substances.

ABSTRACTS OF BRITISH PATENTS

Dough-handling machine

The sides of a shaper device for dough pieces are formed from channel members carried on transverse rods which are rotatable to vary the width of the shaper, vertical feed rollers being mounted on the feed-in ends of such members.—750,935. *Sorensen Bakery Equipment, Ltd.*

Bread-slicing machine

An endless band cutter blade is cross-mounted between two drums rotatable in opposite senses about parallel axes. A four-pulley system provides power for the opposed rotary movements of such drums.—750,985. *American Machine and Foundry Co.*

Food preservation

An antibiotic product active against microbes causing fermentation and decomposition of foods is obtained by allowing the bacteria causing the decomposition to grow on food of the type to be preserved and then slowly killing them off (*e.g.* by radiation or chemicals) when the micro-organism produces an antibacterial substance toxic to such organisms, which can be isolated.—750,797. *Industrie Prodotti Agricoli I.P.A.*

Ice-cream production

A freezing tray incorporates motor-driven counter-rotating agitators which are selectively engageable with couplings for reversal of their rotation to effect upward or downward flow of the material in the tray so as to provide different consistency of the frozen product.—748,639. *Enterprise Manufacturing Co. of Pennsylvania.*

Whale oil extraction

Cooked material comprising flesh, oil, glue-water and bone particles, has the bone particles separated from the flesh fibres by agitation prior to sieving, and thereafter the mixture of glue-water, oil and particles is centrifuged.—749,702. *F. Flor.*

Mucilages from seeds

In the extraction of mucilages from seeds the seed spermoderm is removed by soaking the seeds (*e.g.* of ceratonia siliqua) with a processing liquid which increases its volume on freezing and then cooling the soaked seeds to below the f.pt. of the liquid when the endosperm becomes detached and can be separated physically.—749,766. *M. Hefti and Co.*

Slaughtered animals

The bodies of fowl and other animals are treated with an aqueous mixture of Ca acetate, $CaCO_3$ and NaCl. The treatment is particularly useful in conjunction with the wet-plucking process.—748,617. *Kiposan A/B.*

Animal fat recovery

Fat is recovered from animal fat-containing portions by separating these portions and hashing them while still containing the natural animal heat and then subjecting them to high frequency vibrations to crack the cellular envelopes containing the fat globules, the temperature during this step being controlled so as to maintain the released fat substantially in liquid form and below the coagulation point of the proteins therein.—748,814. *S.A. Frigorifico Anglo.*

Meat tenderiser

Meshing projecting parts of a roller pair(s) respectively consist of circular cutters and circular saws or milling cutters.—749,965. *R. Mazzoni.*

Dough sheeting mechanism

Wrinkling of a dough sheet at the ingress side of a pair of reversible rollers is obviated by incorporating a slipping clutch mechanism in the drives of the conveyors on the respective sides of the rollers, whereby the feed rate is below the peripheral speed of the rollers in respect of the conveyor which is feeding the dough to the rollers.—749,970. *G. A. Seewer.*

Pasteurising and sterilising apparatus

In apparatus of the kind in which a (subdivided) liquid material is injected into a chamber and treated by steam injection, a device actuated by pressure variations within the chamber acts on a steam-admission valve for automatic injection control. The saturated steam pressure is thereby maintained constant to correspond with a desired treatment temperature.—750,027. *J. J. Ciboit.*

Cube sugar

Different boilings in respective crystallisation vacuum pans are made to result in different predetermined average crystal sizes, the massecuites from the different strikes being mixed prior to centrifuging of the mother liquor, so that the resultant crystals display a higher percentage mean derivation from their average size than do the crystals of an individual massecuite.—750,055. *Svenska Sockerfabriks A.B.*

Fruit-trimming machine

A trimming mechanism located adjacent a conveyor (*e.g.* for pineapples) is adjustable transversely and is locked against transverse movement during a trimming operation. *Cf.* B.P. 650,653.—750,283. *Food Machinery and Chemical Corp.*

Shelling nuts, etc.

Nuts, etc., with perforated or permeable shells have their natural (or an artificially provided) liquid content frozen prior to the usual heating (*e.g.* in a H.F. field) to burst the shells.—750,345. *Slasto Co. of Africa (Pty.), Ltd.*

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MODERN COFFEE PRODUCTION

A. E. Haarer, F.L.S., Dip. Hort., R.H.S.

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If the book has a strong East African flavour, it is not alone because the author has had his practical experience there, but because methods of cultivating coffee in East Africa are now of the highest order and are seldom equalled elsewhere. There are numerous line drawings and over a hundred photographs, some of which were taken by the author himself.

Starting with the early history of coffee, Mr. Haarer discusses at length all aspects of coffee production. There is detailed information on cytology, genetics, environment, shade, lining and holing, pruning, care and maintenance, harvesting, diseases, pests, etc., and a chapter devoted to the economic aspects. In addition, production in Africa, Asia and the Antipodes, and the Western Hemisphere is dealt with in greater detail in separate chapters.

The author's experience began at the age of twenty when he was appointed manager of coffee estates in Uganda. He was directly connected with the formation of the Kilimanjaro Native Planters' Association, now the K.N.C.U. In connection with his botanical collecting work for Kew and the British Museum he was elected a Fellow of the Linnean Society in 1928, and later, in 1930, he took charge of an Agricultural Training School. He now contributes to many journals at home and overseas, and has written several books on fibres.

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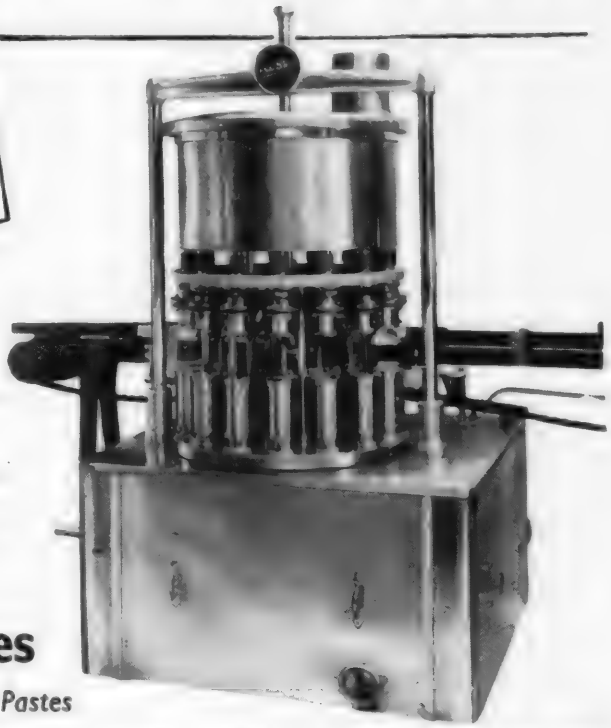

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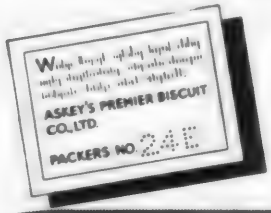

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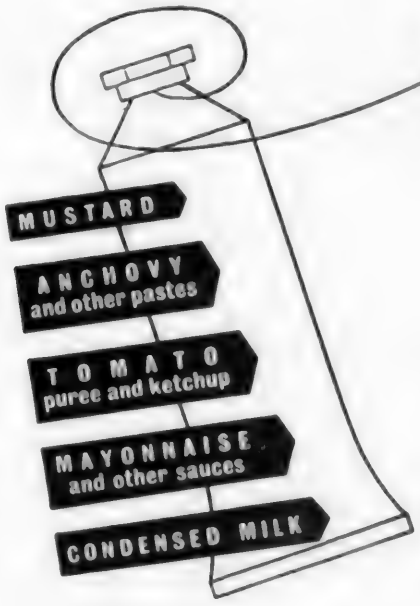

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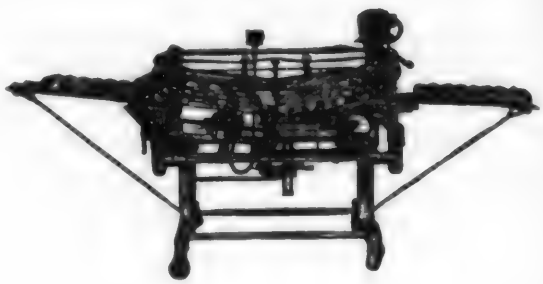

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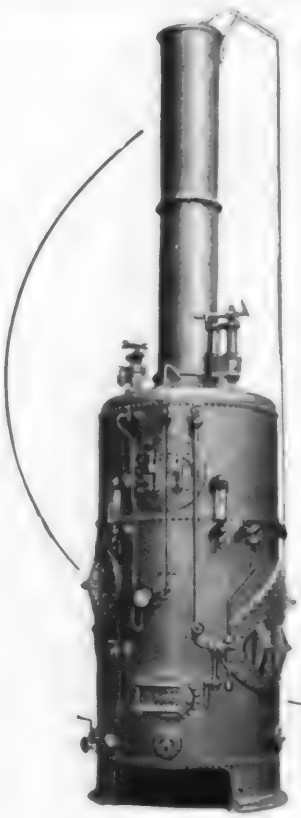

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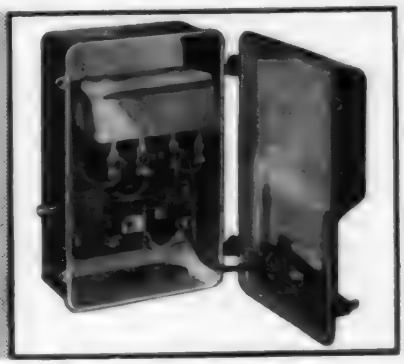

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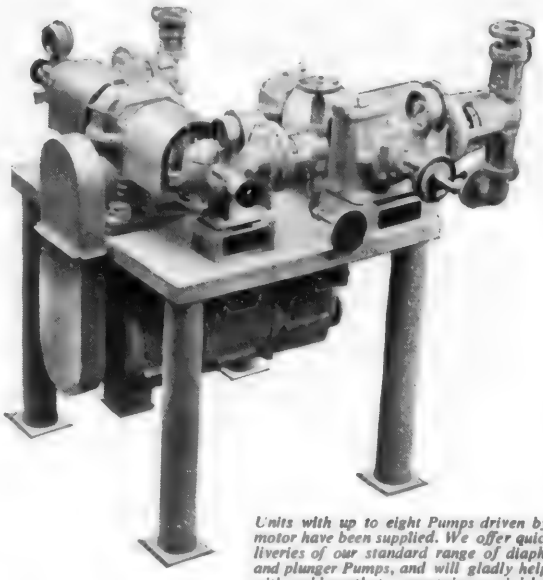

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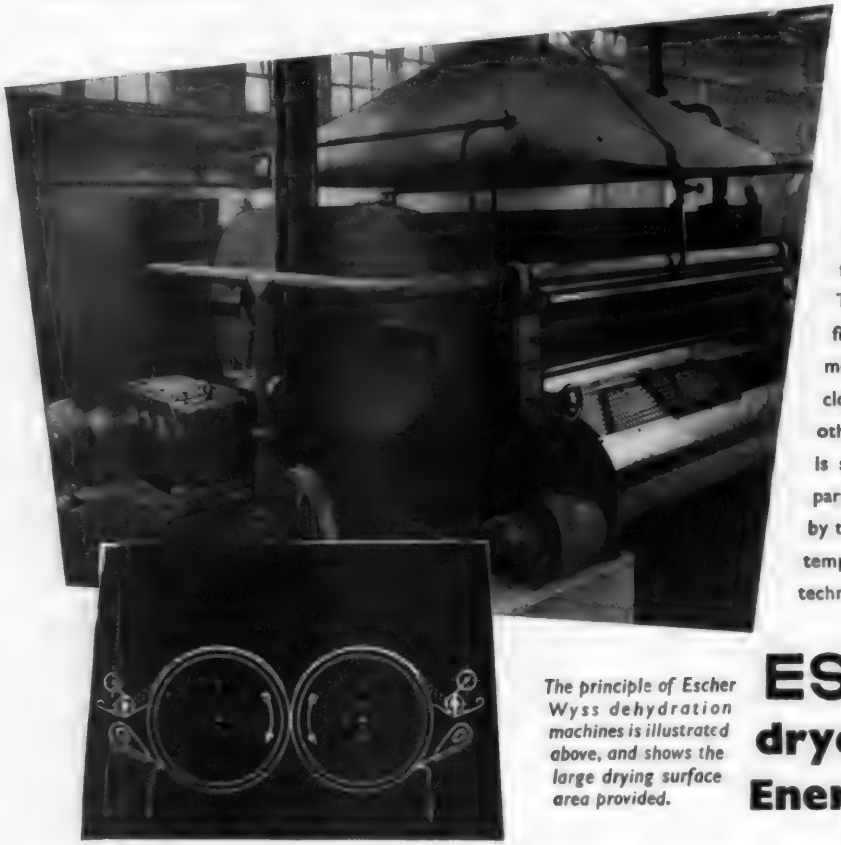

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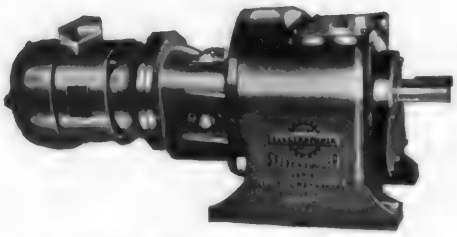

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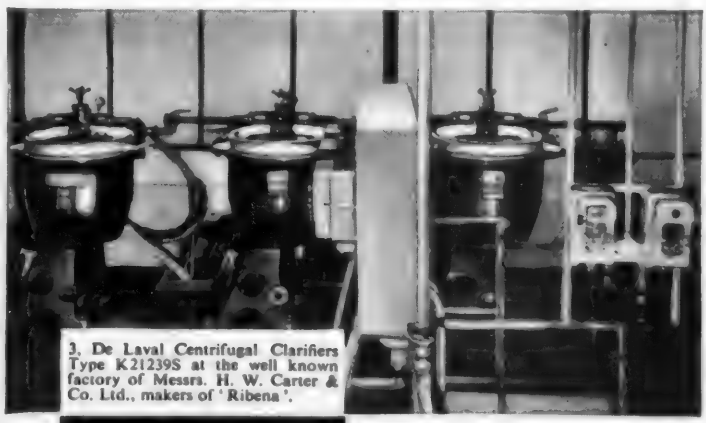

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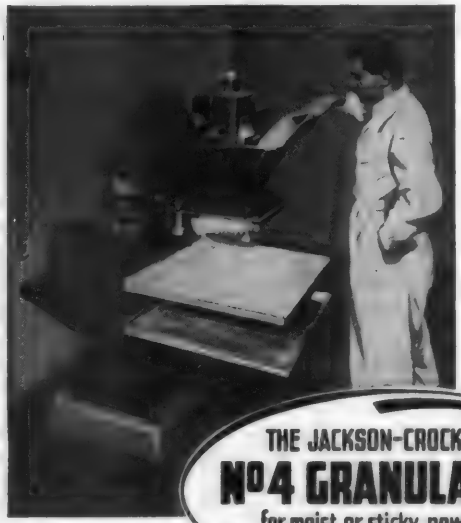

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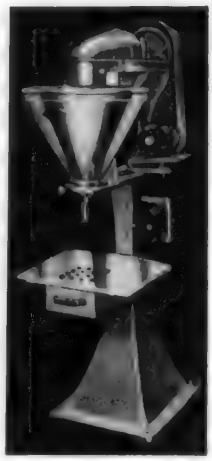

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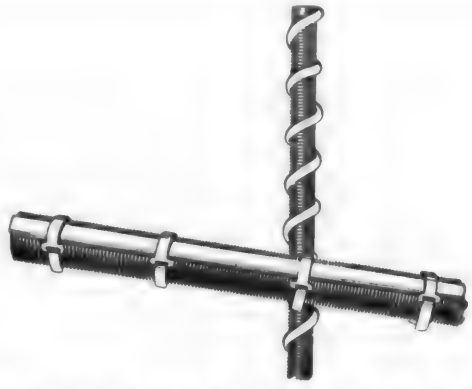

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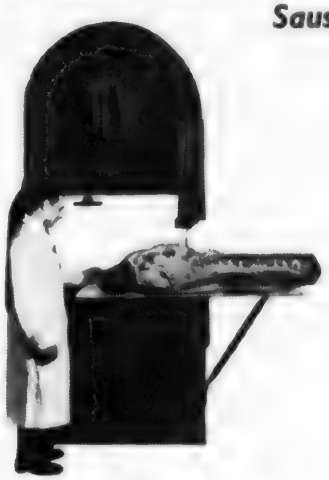

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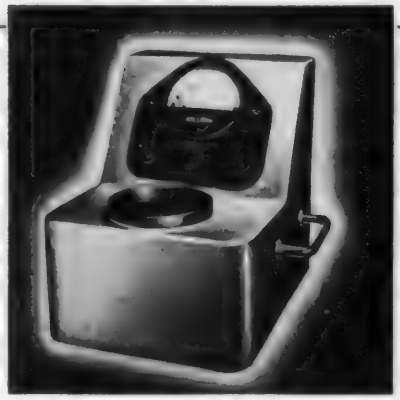

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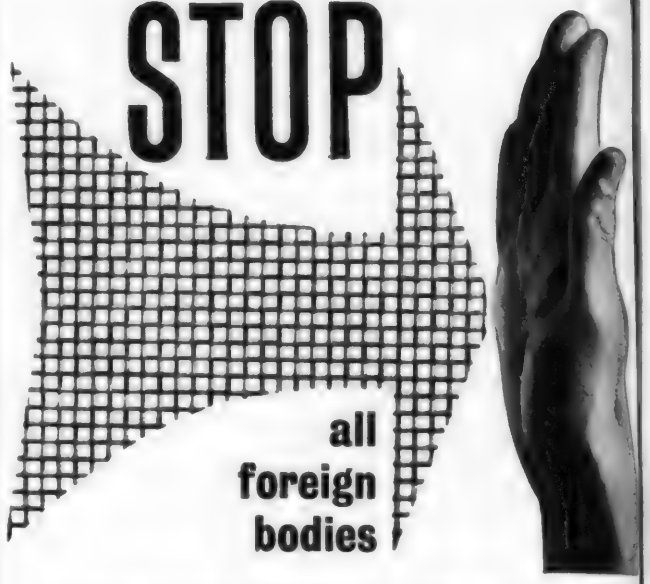

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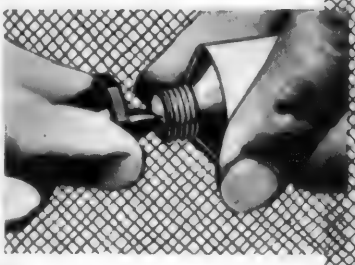

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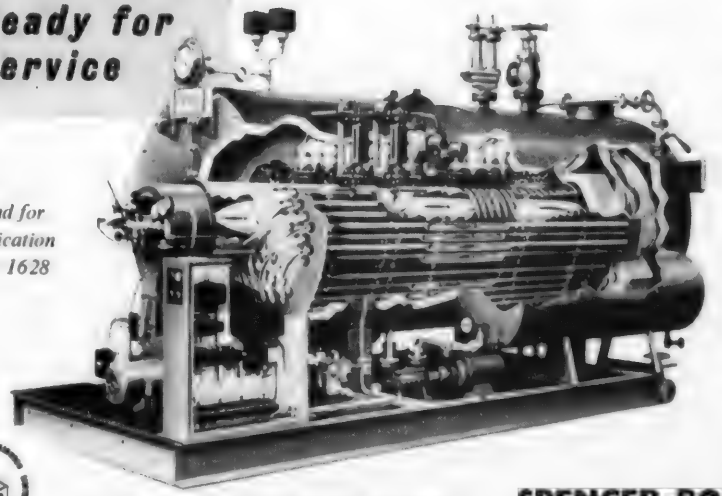

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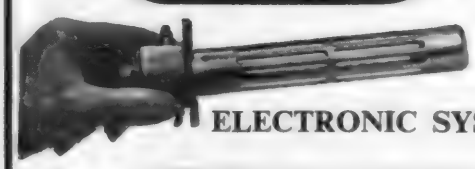

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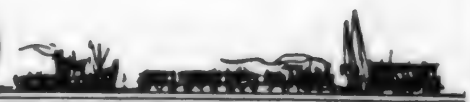

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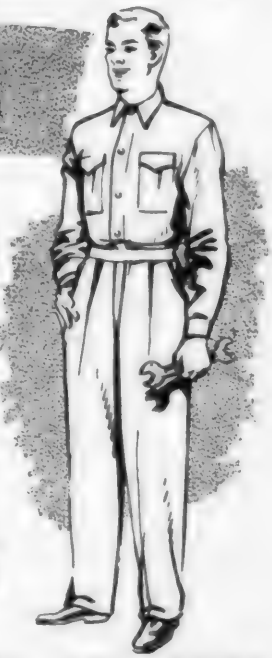

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MEAT Works Manager for a major works in British Isles. Full experience all departments including bacon essential. First class prospects, superannuated. Salary not less than £1,000 a year. Apply giving essential details education, experience, to Managing Director.—Box B5360.

TECHNICIAN having full knowledge of the manufacture of Marshmallow wanted by confectioners in Southern France.—Box B5358.

SENIOR Research Chemist required for the Research and Development Dept. of a large and old-established British Company manufacturing and marketing a wide range of nationally advertised food products. Adequate technical resources and trained staff are available but the number of projects on hand calls for the appointment of a Deputy to the existing Head to relieve him of some of his responsibilities. Applications are invited from men with honours degree or its equivalent, having substantial experience in the Food industry and a real flair for development work. The appointment is an attractive and responsible one and a suitable salary will be paid. Contributory Pension Scheme.—Apply in confidence with full details of age, qualifications, experience and salary required to Box B5357.

LONDON Food Canners (small but growing) have vacancy for man with experience in Fish and Meat Pastes and general Food Canning, also qualification in Food Chemistry, for quality control, development new lines and act as Assistant to Factory Manager.—Write full details of experience and salary required, Box B5337.

CLASSIFIED ADVERTISEMENTS

In FOOD MANUFACTURE

MUST BE PREPAID

4d. a word, minimum 10s.

Box numbers, 1s. extra.

Replies to

BOX NUMBERS

should be addressed to

Food Manufacture, Stratford House, 9 Eden Street, London, N.W.1

SITUATIONS VACANT

PROMOTION of present Technical Manager causes Foster Clark Ltd. of Maidstone, to seek the services of a Food Technician to fill the vacancy. Experience in manufacture of starch food powders, table jellies, soup mixes and kindred lines very desirable. Ability to extend range of products by creation of new lines is an essential requirement. Initiative, inventiveness and native ability are more important than professional qualifications. Substantial remuneration available to first class man.—Applications will be treated in strictest confidence by Managing Director.

FACTORY Manager. Required by Pie, Sausage and Cooked Meat Manufacturers and Bacon Curers in the East Midlands. Essential qualifications are a thorough practical knowledge of the trade, the ability to manage staff and, above all, the desire to make a success of a responsible position. Age preferably under 45. The commencing salary will not be less than £900 p.a. —Applications with full particulars to Box B5367.

CHEMIST required Food Manufacturers in London to establish small Laboratory, also partly to assist in Supervision of Production.—Full details of experience please and indication of salary expected, Box B5338.

PETFOODS LTD. have a vacancy in their Research Laboratory for a man aged 25 years or over to supervise pilot plant operations including pilot plant experimentation. This post could prove of interest to men with Laboratory or engineering experience. Applicants should possess a School Certificate preferably with Physics, Chemistry and/or Mathematics at an advanced level. A high salary, commensurate with age and qualifications will be paid, together with participation in the Company's generous non-contributory Social Security Scheme.—Applications giving details of education and experience should be sent to the Personnel Officer, Petfoods Ltd., Melton Mowbray, Leics.

MELTIS LTD., Chocolate and Confectionery Manufacturers, have a vacancy for an assistant chemist in their new laboratory at Bedford. Applicants should preferably have had several years experience in chocolate and confectionery or an allied food industry. —Applications, giving full details of present position, experience and qualifications, and stating salary required, should be made to the Technical Manager, Meltis Ltd., Miller Road, Bedford.

SITUATIONS WANTED

EXECUTIVE, experienced all aspects bacon, sausage, cooked meats production; meat, fruit and vegetable canning; buying, distribution, administration maintenance, some knowledge sales. Confident of obtaining best results from staff, desires change to senior position offering more than £1,800 per year.—Box B5365.

The Strongest Vanilla Flavour

VANOLEUM

1 oz.(2/6) makes a pint of essence
4 ozs. 8/6 ½ lb. 16/6 1 lb. 32/-

For further details apply:

ARTHUR WHITTAKER & CO. LTD.

30 Church St., Newton Heath, Manchester, 10

BUSINESS OPPORTUNITIES

WE are large buyers of Wooden Barrels and Steel Drums.—The Liffey Cooperage Co., 6, Pim Street, Dublin.

SAUSAGES, Pies and Cooked Meat Manufacturers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train.—Trade Enquiries to Melbray Limited, 158-162, Hurlingham Road, Fulham, London, S.W.6. Tel.: RENown 4411.

250,000 brand new, still in manufacturer's cartons, 1 lb. and 2 lb. Aluminium Pudding Basins, lacquered inside. No reasonable offer refused.—Box B5334.

80,000 2 lb. Circular Tins complete with tops laquered inside, brand new, still packed in manufacturer's cartons. No reasonable offer refused.—B5335.

MOISTURE Testing takes 3 minutes with the "Speedy" Moisture Tester. Works without electricity or skilled labour. Determines moisture content of all food ingredients. Portable, inexpensive, £27 10s. complete. Send for free illustrated leaflet.—Dept. FM.3, Thomas Ashworth and Co. Ltd., Vulcan Works, Burnley, Lancs.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for twenty years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam.—Write for Leaflet 125, Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

DE-GREASING and Cleaning Down. One man can do the work of five with B. and A. steam - cleaning - with - detergent equipment; ready for use from your own steam supply. "Speedylectric" high-efficiency steam lance; 30 ft. steam hose; 15 ft. detergent hose; £44 complete. Ideal for the Food industry.—Bastian and Allen Ltd., Leaflet L.30, Ferndale Terrace, Harrow, Middlesex.

WELL-KNOWN Scottish Pie Makers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train. Branded line, goods packed in cardboard cartons, each containing one dozen.—Trade inquiries to V. C. Pies Ltd., Glasgow. Tel.: Maryhill 1048.

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By Order of Mayfair Products Ltd., who are concentrating at their Glasgow Factory.

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Bean Winnowing and Roasting Unit, Baker Perkins Liquor Mill, Melangeurs, Baker Perkins 5-Roll Refiners, ROTARY AND 4-POT CONCHES, Chocolate Kettles to 1,000-lb. capacity, Jensen Block Moulding Unit, GREER ENROBING PLANTS, B.C.H. and Hansella Mixing and Boiling Pans, Caramel Presses, Brakes and Cutters, Drop Roller Machines, BAKER PERKINS MASTER MOGULS, Cooling Tables, Paste and Fondant Mixers, REFRIGERATION PLANTS, Elevators and Conveyors, ROSE AND SEPAL AUTO WRAPPING MACHINES, Stainless Steel and other Bulk Storage Tanks, Starch and Caramel Trays, Loose Utensils, etc.

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Will Sell the above BY AUCTION on the premises

MAYFAIR BUILDINGS, DURHAM ROAD, WEDNESDAY, OCTOBER 31, 1956

On View Two Days Prior and Morning of Sale. Catalogues (price 6d.) of Leopold Farmer and Sons, Industrial Property, Plant and Machinery Auctioneers and Valuers, 46, Gresham Street, London, E.C.2. Tel.: MONarch 3422.

Note: The Freehold Property having a floor area of 73,000 sq. ft. is for sale by private treaty.

SECOND-HAND PLANT FOR SALE

600

VERTICAL four-roll Refining Mill by Buhler, steel-cored rolls 29½ in. long by 12 in. diam., driven through helical gears by fast pulley. Hand-wheel adjustment at front with pressure gauges and scraper knife. Built in feed hopper at top with fluted feed roll, knife and eccentric lever for engaging. Top roll fluted, others plain.

Melangeur by J. M. Lehmann, 6 ft. diam., cast steel bed and sides 12 in. deep with side outlet. Twin granite rolls 27 in. diam. by 13 in. face, under-driven through crown wheel and pinion. Underneath of pan fitted two-turn 2 in. diam. pancake steam coil. Ploughs and scrapers mounted on cross-head with hand-wheel adjustment. Pan enclosed in plywood cover with slide door for inspection. Mounted on single bedplate.

Pomace Disintegrator and Blower by H. Beare and Son Ltd., vee belt driven by 10 h.p. 400/3/50 motor. Blower capacity 6/8 tons pressed pomace per hr. Feed trough.

Complete Vacuum Drying Plant by Scott, comprising horiz. band drier, approx. 35 ft. long by 6 ft., with service feed hoppers, shaker feeder, condensate receivers for hotplates, vacuum augmentor, Kek mill, screening and finished material hoppers, tailings elevator, wet and dry vacuum pumps. Fully motorised.

Complete Drying Plant by Dunford and Elliott, comprising rotary louvre drier, approx. 18 ft. long by 4 ft. diam., geared motor drive, complete with Keith Blackman steam heater, attendant motor driven fan, steam traps, motor driven exhaust fan, cyclone, etc.

Patent Tubular Drier by Simon, model 0B, approx. 11 ft. 6 in. long by 32 in. by 32 in., ⅜ in. c.i. bolted constr. Fitted revolving nest of steam tubes for 100 lb./sq. in. w.p. Drier fitted feed hopper and worm conveyor, exhaust fan, motor, etc.

Single-roll Spray Film Drier by Kestner, 10 ft. long by 42 in. diam., constr. close grain c.i. 1½ in. Drum carried on steel trunnions in roller bearings. Supported on cast iron framework and fitted tinned steel hood and enclosure for pipework, etc. Complete with stainless steel knives, Alley and MacLellan air compressor set. Filter-type receiver, extraction fan, electric motors, etc.

Twin-cylinder steam-heated Drum Drier, rolls 40 in. long by 28 in. diam., suitable for steam pressure of 100 lb./sq. in. Splash feeder.

Steam-jacketed Trough Mixer by Dobson and Barlow, mixing trough 53 in. long by 43 in. wide by 46 in. deep, fitted twin glanded "Z" blade agitators, double enclosed gearing. Driven by 30 h.p. Brook motor. Tilting electrically operated through chains and counterbalance weight. Supported in steel framework.

Vertical Cake Mixer by Crypto, 40-qt. capacity, three-speed, with dough hook, whisk, beater and mincing attachments. Motorised 230/250/1/50. M.S. bowl 16 in. diam. by 14½ in. deep, hand-wheel operated rise and fall gear.

Vertical Change-pan Mixer by Hobart, 30-qt. capacity, three-speed, with cut-out. Sun-and-planet motion agitator with alloy flat beater and one tinned bowl, 14 in. diam. by 13 in. deep. Bowl raised and lowered. Motorised 400/3/50 through encl. gears.

Rectangular stainless steel Vessel, 6 ft. 6 in. long by 36 in. by 30 in. welded constr. approx. 18G., 1½ in. flanged top, 1½ in. diam. bottom flange outlet.

80-gal. stainless steel steam-jacketed Boiling Pan by Groen Mfg. Co. of U.S.A., 32 in. diam, by 29 in. deep, hemispherical bottom, jacketed in this portion only. Bottom run-off fitted plug cock and hinged lid. Jacket suitable 40 lb./sq. in. w.p., fitted release valve and cock.

Four 40-gal. open top steam-jacketed copper Boiling Pans by Brierley, Collier and Hartley, 25 in. diam. by 18 in. deep including hemispherical bottom. Top edge wired incorporating pouring lip. Hand tilting. Cast iron jacket for 60 lb./sq. in. w.p. Mounted in stand.

Unused jacketed copper hemispherical Boiling Pan by Brierley, Collier and Hartley, 21 in. diam. by 15 in. deep, contra-rotating bronze scraper-type agitators driven by f. and l. pulleys. Screwed steam connections and glanded trunnion bearings. Hand-wheel tilting. Mounted on cast iron frame. Pouring spout. Jacket suitable for 30 lb./sq. in. w.p.

(continued in next column)

SECOND-HAND PLANT FOR SALE

Walmar Mark V Chocolate Enrober by Walter Denis-Contacts. Water-jacketed chocolate bath fitted immersion heater and thermostat, 6 in. wide chain-type conveyor in coating section, air operated rippler, cooling section approx. 56 in. long mounted over 6 ft. centres, flat belt conveyor fitted 6 in. wide canvas belt covered food grade rubber. Cooling supplied by self-contained refrigeration unit; complete with A.C. motors.

Jelly Cutter by Brierley, Collier and Hartley, table 19½ in. by 19½ in. deep, adjustable daylight at present 1.½ in., 48 sections forming slabs 3¼ in. by 2¼ in. F. and L. pulley drive.

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STAINLESS. One 500-gal. and one 80-gal. stainless steel Vessel, water-jacketed, electrically heated, with Mixer.—Seen Abietsan Manufacturing Company Ltd., Concordia Works, Carmichael Road, London, S.E.25. Tel.: Addiscombe 2261.

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SPRAY Drier. Complete Kestner Spray Drier for sale. Gas fired. Bargain price. Must be removed from building within 3 months. £500.—Box B5361.

KELLOGG Company of Gt. Britain Ltd., Stretford, Manchester; Tel.: Longford 3311 offer for sale the following equipment in first-class condition installed in 1954 for project since abandoned: Two Simon Entoleter Infestation Destroyers, type H15. Two Simon Entoleter Mixers, type H15. Two Simon triple-section 24-sleeve Dust Collectors. Two Fans with motors for above Collectors. Two Simon 12 Sieve Junior Sifters. One Rohwer Air Pressure Filler with cylinder capacity 200 litres-450 lb., supplied by Union Food Machinery and Equipment. One Bivac, type "D", 7½ h.p. Portable Industrial Vacuum Cleaning Plant. One Model F2 Syntron Feeder Conveyor. One Gardner Rapid Mixer, size EE. One Berkel Portable Dial Scale, model 1121, dial capacity to 400 lb., 4-oz. divisions, complete with ticket-printing Weight Recorder. Two 500-lb. Avery Portable Platform Scales, model 3205. Two Mixer Vessels. One Head Wrightson Selectro Vibrating Screen, 2 ft. by 4 ft. long, single deck. Two Cone Feeders by Pneumatic Scale Cor.—Also many other items, motors, starters, reducers, elevators, etc.

VARIOUS selection copper c.i. steam-jacketed Boiling Pans for sale, Tilt and Non-tilt, with or without Stirrers. Suitable for Food Processing.—Box B5359.

MICROSOL Fog Generators, 202 Model, 200/250 A.C./D.C.; ideal for Insecticide or Germicidal Spraying. Very cheap.—Box B5316.

"GARDNER" stainless steel E-size Sifter/Mixer. "Gardner" F-size Sifter/Mixer and "Gardner" G-size Mixer only. 12-in. Magnetic Separator 230v. "Reddrop Periflo" Grinding Mill by Pascall. Homogeniser by Jensen and Anderson, 100-gal./hr. BCH copper jacketed Mixing Machine, 19 in. by 16 in. by 24 in. deep, motorised. Copper jacketed Pan (all copper), 24 in. diam. by 15 in. deep. "Artofex" 1½-sack Dough Mixer motorised. 20-qt., 30-qt. and 80-qt. Change Bowl Mixers by Hobart, Peerless, Melvin, Ericsson. Vacuum Tin Sealing Machine and Pump. Vacuum Pumps (2), two-cyl. 5-in. bore by 8-in. stroke d.a. for belt drive. Hydraulic Capsule Moulding Press by Wilkinson.—Welding, Son and Co., Saxone Buildings, Tarleton Street, Liverpool, 1.

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PLANT FOR SALE

FIFTY-GAL. stainless lined steam-jacketed Boiling Pan. Hinged lid, 1½-in. outlet, makers Groen Manufacturing Co., Chicago, U.S.A. £15 ex works.—Marsh and Sons, 266, Duke Street, Barrow.

FIVE Electronic Eyes with Dust Extractor and Elevators. Five Cherry Declusterers with Starters and Motors. One Purdy Labelling Machine. Two Auto Pack Weighing Machines for 2 oz. to 16 oz., Peas or Cereals, complete with geared motor. All the above in good condition.—Write Box B5356.

FOR sale Jelly or Fondant Depositor, suit Confectionery manufacturer with medium tonnage.—Box B5362.

TWO Southall and Smith Automatic Flour Weighers to weigh 1 to 3 lb. of flour at 10/12 weighings per minute, each complete with hopper and stand. In good condition.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

SMALL complete Jam Manufacturing Unit, consisting of Electrode Steam Boiler, three Boiling Pans complete with all pipe lines and fittings, Rotary Filling Table, Labeller, Pulping, Cutting, Mixing and Whipping Machines, Scales, Water Softener Pans, Laboratory Equipment. Can be seen any time. Also Freehold Factory and Offices if required. Midlands area.—Box B5363.

250- and 500-gal. stainless steel Tanks with agitators, stainless steel interior Milk Cooling or Cream Ripening Vat with tubular agitator, Pasteuriser, Benhil Butter and Margarine Packer, Southall and Smith 2-lb. automatic Flour Weighing Machine, Mixers, Kneaders, Ovens, Racks, Provers, etc. Your enquiries welcomed.—Sorensen Bakery Equipment Ltd., 42, Raby Street, Manchester, 16. Tel.: Moss Side 2054. 'Grams: Rahbek.

THREE Albro vacuum operated Mincemeat Filling Machines, of all stainless steel construction with bulk filling hoppers. Capacity approx. 25 by 1 lb. jars per minute and complete with self-motorised vacuum pumps. New condition. Alite Compression Type Mincemeat Filling Machine in stainless steel and B.C.H. Gunmetal Lined Mincemeat Mixing Machine.—Full details from C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

KELLIE Type 4FP Automatic Jam Filling Machine, motorised with two-speed gear. Complete with copper tank and cups for 1- and 2-lb. jars. Unused since new 1945. Two 40-gal. copper tilting Jam Boiling Pans, suitable 70 lb. s.w.p. — Details from C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

NEWMAN Model 23A Bench Bottle Labelling Machine, with motor drive and labelling parts. Perfect condition throughout.—Apply Box B5366.

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capable of deep freezing 1,000 lbs. per hour continuously; swing tray type; size 15′×12′×10′.

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ESSCHER Wyss Dehydration Machine.—Apply Box B5368.

AUTOM. Soldering Machine, Karges-Hammer L.A. 755 for can making. Double Flanging Machine, Type Fix, Komet Aut. Seaming Machine.—Apply Box B5369.

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WAXED Liners, 18 in. by 12 in. by 24 in., stock surplus to manufacturers requirements, are offered at the special price of £7 15s. per thousand delivered.—Enquiries please to Box B5354.

MEAT Packing Factory for sale near Lissabon, built 1947, exceptionally well situated, especially for export.—Dr. Werner Hauschild, Hannover, Königstr. 7, Deutschland.

APPROXIMATELY two tons of Blackcurrant Jelly in 28-lb. tins, 80 per cent. soluble solids. Reasonable price. First class condition.—Offers to Teasdale and Co. Ltd., Carlisle.

SECTIONAL Buildings, timber, timber and asbestos, 10 in. by 24 in. spans. A few second-hand buildings available. Enquiries invited for Site Huts, Temporary Offices, Club Rooms, Church Halls etc. Free Catalogue.—Universal Supplies (Belvedere) Ltd., Crabtree Manorway Belvedere, Kent. (Erith 2948.)

TRAYS. Heavily galvanised perforated mild steel stacking trays, size 25 in. by 6½ in. by 11½ in.; price 4s. each—discount on quantities; ideal for food and fish industries; send P.O. for sample.—Alfred's Ices (1954) Ltd., 3/5, Hall Place, London, W.2. Tel.: PAD 6619.

250,000 brand new, still in manufacturer's cartons, 1 lb. and 2 lb. Aluminium Pudding Basins, lacquered inside. No reasonable offer refused.—Box B5334.

80,000 2 lb. Circular Tin s complete with tops lacquered inside, brand new, still packed in manufacturer's cartons. No reasonable offer refused.—B5335.

ALL Your Polythene Bag Requirements, all sizes and sack liners, lowest prices, actual manufacturers.—Polyplak Containers Ltd., 54, Warwick Square, S.W.1. Tel.: VIC 5682.

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BRAMLEY Apples for Pulping or Juice. 500 tons available end September onwards. Price per ton delivered will be quoted upon receipt of enquiry.—Write, T. F. Stephens, 13, Manor Road, Rusthall, Tunbridge Wells, Kent.

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ADVERTISER purchases Waste Fats and Oils.—Give full details and forward samples to L. R. Stevens, "Stella Maris," Dirtham Lane, Effingham, Surrey. Tel.: East Horsley 3229.

WE would be glad to hear where we can purchase Hardwood or Semi-hardwood Casks in large quantity.—The Liffey Cooperage Co., 6, Pim Street, Dublin.

STONE Jars wanted to purchase. Any district.—Full particulars to T. Gunn (Rayleigh) Ltd., 206, London Road, Rayleigh, Essex. Tel.: Rayleigh 87.

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2.

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Diesel engines. Diesel generator sets. Any type surplus diesel plant. Immediate cash. We clear if required. P. R. Lowe and Co., 34a Rainham Road, London, N.W.10. Tel.: LAD 4005.

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Butter Packing Machine Wanted
Apply stating age, make, price, etc., to Box B5341.

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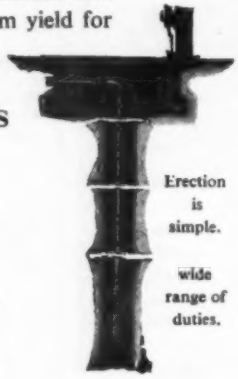

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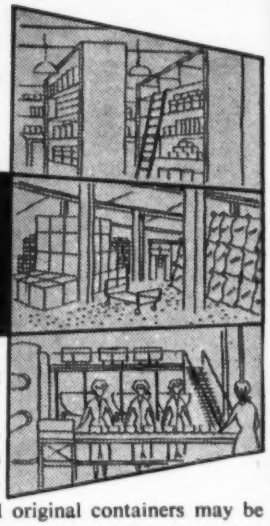


Insect Pests are DEAD AGAINST FUMITE

Simply, safely and efficiently FUMITE DDT/LINDANE smoke insecticide destroys common insect pests in Stores, Warehouses, Factories, and protects timbers against wood-boring beetle attack. Foodstuffs in bulk, bags and original containers may be treated *in situ* at the recommended dosage without fear of tainting. For a few pence for 1,000 cubic feet, FUMITE clears the premises of pests and *keeps* them clear for months.

Quick-acting FUMITE LINDANE is specially recommended in cases where DDT is not acceptable.

New specially designed FUMITE Dieldrin/Lindane for the destruction of cockroaches in small spaces.

FUMITE DDT/LINDANE Smoke Insecticide

British Patent Nos. 621732, 621894, and 1903/56—others pending

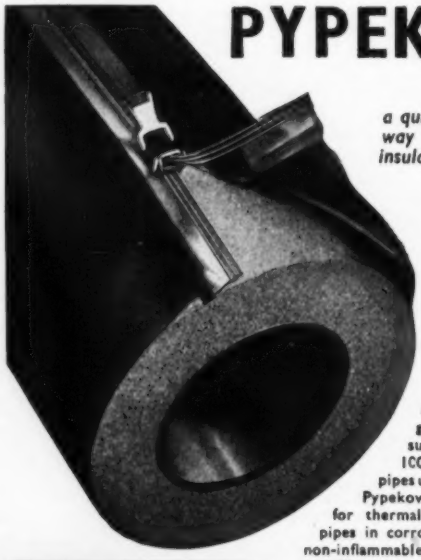
Obtainable from Servicing Companies, Chemists and through all branches of Boots

Special instruction leaflet from the Sole Manufacturers:

WAECO LTD. (FUMITE DIVISION)

120/2 VICTORIA STREET, LONDON, S.W.1 Tel: *Tate Gallery 9626*

PYPEKOVER



a quicker, cheaper, better way to protect thermally insulated and other pipes

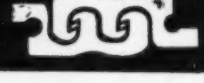
JUST ZIP IT ON AND OFF

This new development for covering pipes and ducts is made from Poly-Vinyl Chloride Sheet and provided with a longitudinal air and water tight "Flexi-grip" slide fastener. It is supplied in lengths up to 100 ft. and in widths to fit pipes up to 75 in. circumference.

Pypekover is the ideal protection for thermally insulated and other pipes in corrosive atmospheres. It is non-inflammable and there are no metallic parts. It does not rot or harden from exposure to weather. Water will not penetrate when pipes are washed or hosed.

Pypekover can be fitted by unskilled labour in a fraction of the time needed for canvas and paint. Can be removed easily and re-used. Many colours for identification. JUST ZIP IT ON AND OFF.

LOCKS IN PLACE



SAMPLE LENGTH *with technical details and prices on request.*

VICKERYS
LIMITED

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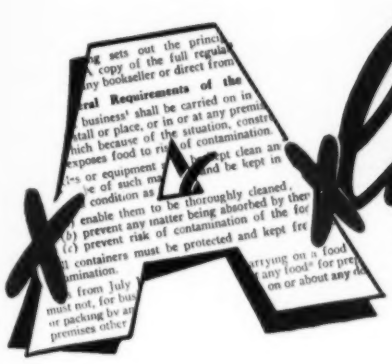
Telephone: WATerloo 7041-2-3

FOOD HYGIENE REGULATIONS 1955



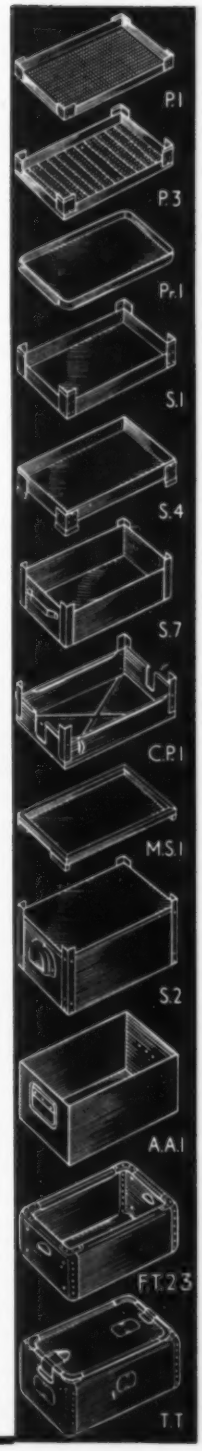
Aluminium

MEETS ALL REQUIREMENTS

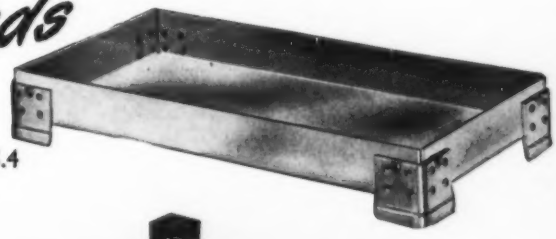
PHOENIX *is* the answer! Study the above clauses carefully: "Articles of equipment . . . shall be kept clean—and in such good order . . . as to (a) enable them to be thoroughly cleaned; (b) prevent any matter being absorbed by them; (c) prevent risk of contamination of the food."

Industrial cleanliness is assured by the use of PHOENIX products, affording maximum germ-free conditions in the handling and storing of food.

PHOENIX equipment is hygienic, durable and economical, easily cleaned and sterilised, and *always* maintains the highest standards in all packaging fields. Your staff prefer light, easy-to-handle PHOENIX Trays and Containers.



For your needs


S.4

S.4 ALUMINIUM WORKING TRAY in light aluminium alloy, for sorting, etc., on benches and tables. Rust-proof and corrosion resisting, inter-stacking corner angles keep tray clear of working surfaces, floors, etc.

S.3

S.3 Easily handled interstacking tray with good depth, seamless base, reinforced corners and cut-out hand grips. Particularly suitable for handling and storage of butchers' sundries, sausage meats, etc.

WE "TAILOR" EQUIPMENT TO YOUR SPECIFIC REQUIREMENTS

PHOENIX HESTON EQUIPMENT CO. LTD. *is the answer*

OTHER PHOENIX TYPES ARE ILLUSTRATED ON THE RIGHT. ENQUIRIES ARE INVITED TO DEPT. F.M. AT ADDRESS BELOW

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Has a refined and delicate coffee flavour and can be used in all coffee flavoured dessert powders, beverage mixtures and as a coffee extender.

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